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MILITARY MEDICAL MANUALS

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SHELL SHOCK COMMOTIONAL AND EMOTIONAL ASPECTS

SHELL SHOCK

COMMOTIONAL AND EMOTIONAL ASPECTS

BY

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WITH PREFACE BY

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GENERAL INTRODUCTION

THE infinite variety of injuries which any war presents to the surgeon gives to military surgery a special interest and importance. The special interest and importance, in a surgical sense, of the great European War lies not so much in the fact that examples of every form of gross lesion of organs and limbs have been seen, for if we read the older writers we find little in the moderns that is new in this respect but is to be found in the enormous mass of clinical material which has been presented to us and in the production of evidence sufficient to eliminate sources of error in determining important conclusions. For the first time also in any campaign the labours of the surgeon and the physician have had the aid of the bacteriologist, the pathologist, the physiologist, and indeed of every form of scientific assistance, in the solution of their respective problems. The clinician entered upon the great war armed with all the resources which the advances of fifty years had made available. If the surgical problems of modern war can be said not to differ sensibly from the campaigns of the past, the form in which they have been presented is certainly as different as are the methods of their solution. The achievements in the field of discovery of the chemist, the physicist and the biologist have given the military surgeon an advantage in diagnosis and treatment which was denied to his predecessors, and we are able to measure the effects of these advantages when we come to appraise the results which have been attained.

But although we may admit the general truth of these statements, it would be wrong to assume that modern scientific knowledge was, on the outbreak

of the war, immediately useful to those to whom the wounded were to be confided. Fixed principles existed in all the sciences auxiliary to the work of the surgeon, but our scientific resources were not immediately available at the outset of the great campaign; scientific work bearing on wound problems had not been arranged in a manner adapted to the requirements—indeed, the requirements were not fully foreseen; the workers in the various fields were isolated, or isolated themselves, pursuing new researches rather than concentrating their powerful forces upon the one great quest.

However brilliant the triumphs of surgery may be—and that they have been of surpassing splendour no one will be found to deny—experiences of the war have already produced a mass of facts sufficient to suggest the complete remodelling of our methods of education and research.

The series of manuals, which it is my pleasant duty to introduce to English readers, consists of translations of the principal volumes of the “Horizon” Collection, which has been appropriately named after the uniform of the French soldier.

The authors, who are all well-known specialists in the subjects which they represent, have given a concise but eminently readable account of the recent acquisitions to the medicine and surgery of war which had hitherto been disseminated in periodical literature.

No higher praise can be given to the Editors than to say that the clearness of exposition characteristic of the French original has not been lost in the rendering into English.

MEDICAL SERIES

The medical volumes which have been translated for this series may be divided into two main groups, the first dealing with certain epidemic diseases, including syphilis, which are most liable to attack soldiers, and the second with various aspects of the

neurology of war. The last word on *Typhoid Fever*, hitherto "the greatest scourge of armies in time of war," as it has been truly called, will be found in the monograph by MM. Vincent and Muratet, which contains a full account of recent progress in bacteriology and epidemiology as well as the clinical features of typhoid and paratyphoid fevers. The writers combat a belief in the comparatively harmless nature of paratyphoid and state that in the present war hæmorrhage and perforation have been as frequent in paratyphoid, as in typhoid fever. In their chapter on diagnosis they show that the serum test is of no value in the case of those who have undergone anti-typhoid or anti-paratyphoid vaccination, and that precise information can be gained by blood cultures only. The relative advantages of a restricted and liberal diet are discussed in the chapter on treatment, which also contains a description of serum-therapy and vaccine-therapy and the general management of the patient.

Considerable space is devoted to the important question of the carrier of infection. A special chapter is devoted to the prophylaxis of typhoid fever in the army. The work concludes with a chapter on preventive inoculation, in which its value is conclusively proved by the statistics of all countries in which it has been employed.

MM. Vincent and Muratet have also contributed to the series a work on *Dysentery, Cholera and Typhus* which will be of special interest to those whose duties take them to the Eastern Mediterranean or Mesopotamia. The carrier problem in relation to dysentery and cholera is fully discussed, and special stress is laid on the epidemiological importance of mild or abortive cases of these two diseases.

In their monograph on *The Abnormal Forms of Tetanus*, MM. Courtois-Suffit and Giroux treat of those varieties of the disease in which the spasm is confined to a limited group of muscles, e.g. those of the head, or one or more limbs, or of the abdomino-

thoracic muscles. The constitutional symptoms are less severe than in the generalized form of the disease, and the prognosis is more favourable.

The volume by Dr G. Thibierge on *Syphilis in the Army* is intended as a *vade mecum* for medical officers in the army.

Turning now to the works of neurological interest, we have two volumes dealing with lesions of the peripheral nerves by Mmc. Atanassio Benisty, who has been for several years assistant to Professor Pierre Marie at La Salpêtrière. The first volume contains an account of the anatomy and physiology of the peripheral nerves, together with the symptomatology of their lesions. The second volume is devoted to the prognosis and treatment of nerve lesions.

The monograph of MM. Babinski and Froment on *Hysteria or Pithiatism and Nervous Disorders of a Reflex Character* next claims attention. In the first part the old conception of hysteria, especially as it was built up by Charcot, is set forth, and is followed by a description of the modern conception of hysteria due to Babinski, who has suggested the substitution of the term "Pithiatism," i.e. a state curable by persuasion, for the old name hysteria. The second part deals with nervous disorders of a reflex character, consisting of contractures or paralysis following traumatism, which are frequently found in the neurology of war, and a variety of minor symptoms, such as muscular atrophy, exaggeration of the tendon reflexes, vasomotor, thermal and secretory changes, etc. An important section discusses the future of such men, especially as regards their disposal by medical boards.

An instructive companion volume to the above is to be found in the monograph of MM. Roussy and Lhermitte, which embodies a description of the psychoneuroses met with in war, starting with elementary motor disorders and concluding with the most complex represented by pure psychoses.

SURGICAL SERIES

When the present war began, surgeons, under the influence of the immortal work of Lister, had for more than a quarter of a century concerned themselves almost exclusively with elaborations of technique designed to shorten the time occupied in or to improve the results obtained by the many complex operations that the genius of Lister had rendered possible. The good behaviour of the wound was taken for granted whenever it was made, as it nearly always was, through unbroken skin, and hence the study of the treatment of wounds had become largely restricted to the study of the aseptic variety. Septic wounds were rarely seen, and antiseptic surgery had been almost forgotten. Very few of those who were called upon to treat the wounded in the early autumn of 1914 were familiar with the treatment of grossly septic compound fractures and wounded joints, and none had any wide experience. To these men the conditions of the wounds came as a sinister and disheartening revelation. They were suddenly confronted with a state of affairs, as far as the physical conditions in the wounds were concerned, for which it was necessary to go back a hundred years or more to find a parallel.

Hence the early period of the war was one of earnest search after the correct principles that should be applied to the removal of the unusual difficulties with which surgeons and physicians were faced. It was necessary to discover where and why the treatment that sufficed for affections among the civil population failed when it was applied to military casualties, and then to originate adequate measures for the relief of the latter. For many reasons this was a slow and laborious process, in spite of the multitude of workers and the wealth of scientific resources at their disposal. The ruthlessness of war must necessarily hamper the work of the medical scientist in almost every direction except in that of

providing him with an abundance of material upon which to work. It limits the opportunity for deliberate critical observation and comparison that is so essential to the formation of an accurate estimation of values; it often compels work to be done under such high pressure and such unfavourable conditions that it becomes of little value for educative purposes. In all the armies, and on all the fronts, the pressure caused by the unprecedented number of casualties has necessitated rapid evacuation from the front along lines of communication, often of enormous length, and this means the transfer of cases through many hands, with its consequent division of responsibility, loss of continuity of treatment, and absence of prolonged observation by any one individual.

In addition to all this, it must be remembered that in this war the early conditions at the front were so uncertain that it was impossible to establish there the completely equipped scientific institutions for the treatment of the wounded that are now available under more assured circumstances, and that progress was thereby much hampered until definitive treatment could be undertaken at the early stage that is now possible.

But order has been steadily evolved out of chaos, and many things are now being done at the front that would have been deemed impossible not many months ago. As general principles of treatment are established it is found practicable to give effect to them to their full logical extent, and though there are still many obscure points to be elucidated and many methods in use that still call for improvements, it is now safe to say that the position of the art of military medicine and surgery stands upon a sound foundation, and that its future may be regarded with confidence and sanguine expectation.

The views of great authorities who derive their knowledge from extensive first-hand practical experience gained in the field cannot fail to serve as a

most valuable asset to the less experienced, and must do much to enable them to derive the utmost value from the experience which will, in time, be theirs. The series covers the whole field of war surgery and medicine, and its predominating note is the exhaustive, practical and up-to-date manner in which it is handled. It is marked throughout not only by a wealth of detail, but by clearness of view and logical sequence of thought. Its study will convince the reader that, great as have been the advances in all departments in the services during this war, the progress made in the medical branch may fairly challenge comparison with that in any other, and that not the least among the services rendered by our great ally, France, to the common cause is this brilliant contribution to our professional knowledge.

A glance at the list of surgical works in the series will show how completely the ground has been covered. Appropriately enough, the series opens with the volume on *The Treatment of Infected Wounds*, by A. Carrel and G. Dehelly. This is a direct product of the war which, in the opinion of many, bids fair to become epoch-making in the treatment of septic wounds. It is peculiar to the war and derived directly from it, and the work upon which it is based is as fine an example of correlated work on the part of the chemist, the bacteriologist and the clinician as could well be wished for. This volume will show many for the first time what a precise and scientific method the "Carrel treatment" really is.

The two volumes by Professor Leriche on *Fractures* contain the practical application of the views of the great Lyons school of surgeons with regard to the treatment of injuries of bones and joints. Supported as they are by an appeal to an abundant clinical experience, they cannot fail to interest English surgeons, and to prove of the greatest value. It is only necessary to say the *Wounds of the Abdomen* are dealt with by Dr Abadie, *Wounds of the Vessels* by Professor Sencert, *Wounds of the Skull*

and Brain by MM. Chatelin and De Martel, and *Localisation and Extraction of Projectiles* by Professor Ombrédanne and R. Ledoux-Lebard, to prove that the subjects have been allotted to very able and experienced exponents.

ALFRED KEOGH

PREFATORY NOTE

BY THE EDITOR

M. LÉRI has placed the medical profession under a debt of gratitude by publishing his lucid observations upon the effects of the strains and horrors of modern warfare, notably those attributable to the use of high explosives. His experience was gained under the most favourable conditions for securing the necessary material. The verge of the battlefield and the precincts of a Field Treatment Centre have the undoubted advantage of being able to observe the initial symptoms uncomplicated by any of the factors that may supervene even in the course of a few hours or days. No one who reads these graphic reports can fail to appreciate their significance and value, and the conclusions he draws are so logical and so well established by his facts that they are irresistible. It is true that the subjects of his observations were of the Gallic temperament, but human nature, of whatever race, when subjected to the conditions described, possesses sufficient in common, to justify the assumption that very little, if any, different conclusion would have been reached had his subjects been the more phlegmatic Briton or even the stolid German.

M. Léri's case for a differentiation between the commotional and emotive states is irrefucable. We know now that commotional conditions are poles asunder from emotive neuroses and emotive neurasthenia. The confusion which has hitherto existed between these states was not due to faulty nomenclature, but was based upon a failure to appreciate and accurately distinguish facts. The very distinct advance in neurological science which this differentiation marks will lead to more correct diagnosis, accurate prognosis, and rational treatment. Defective attention to the difference between conditions which, though apparently similar, are essentially different and call for diametrically opposite treatment, has been the snare which has led to many mistakes. Such errors are now not justified. The particularity of our author's descriptions removes all excuse.

The value of M. Léri's work does not become less with the cessation of hostilities, for although primarily concerned with the commotions and emotions of war, the lessons he teaches are equally applicable to the conditions arising from the accidents and disasters which too frequently occur in everyday life.

It is pointed out that emotional neurasthenia differs very little in its etiology from whatever cause it arises. It is not, as a rule, the consequence of a violent and forceful emotion, but succeeds a series of small fatigues and continuous minor emotions, and

Meige's statement is endorsed that "a strong emotional shock less frequently produces neurasthenia than incessant worries of the interminable complication of a difficult existence." When one considers that millions of men were suddenly torn from their homes environment and were on the battlefield not from choice but from duty, one can well understand that many had "interminable complications," and that their existence was "difficult."

Not only will a host of men, who otherwise would have been shattered wrecks of humanity as the result of their war experiences, reap the benefit of M. Léry's studies, but the growing army of civilian neurasthenics arising in consequence of the increased stress of modern existence will have the true genesis of their condition appreciated and appropriate treatment prescribed. At the present time, when it is of paramount importance in the national interests that the great problem of obtaining the maximum of efficient work from all should be obtained, M. Léry has rendered signal service.

It is made manifest that the most painstaking efforts are required both for diagnosis and treatment of these cases. A man suffering from intense emotional disturbance is so obsessed by the memory of the occurrence that he pays but scant attention to other incidents, and he apparently remembers nothing, yet many instances are given in this work where memories which at first were but sketchy have, as the result of a painstaking conversation,

been revived, showing that pseudo-amnesia, pseudo-obnubilation, and even an apparent loss of localization can be given their proper diagnostic value. The significance of recognizing that, in the emotional patient, the memory of the accident monopolizes all his attention, whereas the commotional patient suffers from retrograde amnesia, sometimes even of the retro-antero-grade type, is a matter of no small importance, and an early endeavour to revivify memories should be undertaken in order to categorize the case.

The author has little to say about malingering, but one can well understand that where men such as he had to be reckoned with, simulation would be at a discount. I confess, however, to taking a somewhat sterner view than merely doubting the *bona fides* of the emotional soldier, quoted by Regis, who apparently suffered from profound amnesia, but who, when asked if he were married, *looked down* at his wedding ring and replied: "I must be, for that is my wedding ring."

Convulsive attacks, epilepsy, mutism, deaf-mutism, pseudo-stammering, spluttering, dysphonia, or scissors walking, which became almost epidemic in some armies, had no place at the neurological centre under Léri's regime, and it is interesting to note, that the number of nervous attacks in the army to which he was attached greatly diminished when the report was spread, by the soldiers who went back to their companies without the anticipated

leave, that “attacks had not a good reputation and were disapproved of.” I fancy, however, that the soldier expressed this sentiment more forcibly and in strictly colloquial language.

I congratulate the translator, who has done his work well, and I am indebted to my friend, Lieut.-Colonel G. D. Gray, for reading the proofs.

JOHN COLLIE

PREFACE

ANCIENT wisdom says that books have their destinies ; this is certainly true of the book that M. Léri gives us to-day. It is lucky for him that it comes late, for it comes at the right time.

What modifications with regard to commotional patients our minds have undergone during these last two years of war !

In 1914 and 1915 the majority of us had a tendency to consider them either as purely neuropathic or psychopathic, or as exaggerators or even malingerers ; further, the treatment they received was not without the idea of being a preventive. Then, under the influence of the facts reported by Ravaut, Guillain, Léri and a good many other authors, an idea disentangled itself—namely, that amongst these commotional patients it was not rare to find some in whom a minute objective examination might reveal the existence in the nervous centres and their coverings, either of a genuine organic lesion or at least of organic modifications which could be directly verified.

These variations in ideas correspond to an analogous change in the spirit of the publications which have appeared on the subject.

The neuro-psychiatric disturbances which have supervened, as the result of the fatigues and emotions of war, whether mental affections or hysterical mani-

festations are concerned, were at first regarded as different from the neuro-psychiatric troubles observed in civilians before the war, rather owing to their frequency than to their nature itself. And these neuro-psychoses in military patients have been very well described in a certain number of interesting publications.

But both things and ideas have moved since then. True, these mental troubles, these hysterical manifestations, form the noisy side of post-commotional or post-emotional disturbances, but they are often merely accessories in a clinical picture, the essential element of which is of quite another nature. This is what M. Léri has set out to show in the present book.

Putting aside these parasitic episodes, which vary with each patient in the picture of commotions and of emotions of war, the author has been able to determine the characteristics of a physical and psychical commotional syndrome, on the one hand, and of an emotional syndrome on the other; both are very simple, and there is a great difference between them. Further, they are distinctly different from the generally complex and diffuse syndromes that certain authors have endeavoured to establish.

M. Léri found himself in particularly favourable conditions for tackling these difficult problems, having been able repeatedly, and for a fairly long time, to study the effects of commotions and emotions at each of the three halting-places through which evacuated soldiers are passed.

As one knows, these are as follows: first, the clearing station; secondly, the field hospital; thirdly, the inland hospital.

Although it is obvious that the symptoms are presented in their greatest purity at the first halting-place especially, it is only at the third that the majority of us are able to study and differentiate these commotional and emotional conditions. Nevertheless, only a relatively limited number of commotional and emotional patients reach this third halting-place, by which time they are already in an advanced stage of their evolution. The medical men who have remained in the inland zone having infinitely more facilities for writing than our colleagues at the front, it follows that the delayed commotional conditions observed at the third halting-place are specially those which have been the subject of publications.

This is the reason why the descriptions of these morbid conditions recorded by M. Léri differ so essentially from the majority of those which have been given us. Thanks to him, we see clearly how the physical and mental inertia, the amnesic lacuna of the true commotional patient are so completely opposed to the pseudo-inertia, pseudo-confusion and pseudo-amnesia of the emotional patient. Thanks to him, we see also that these nervous troubles are quite different from the diffuse excitement, the irritation or localized deficiency and the frequently retrogressive amnesia of the cerebral contusional patient.

In the same way we see that the picture of prolonged cerebro-spinal commotion is not less different from that of emotive neurosis or of emotive neurasthenia. It is just this precise differentiation, this methodical description of conditions which are alike in appearance only, but very distinct in essence,

which constitutes the most original and important part of this book. The invaluable part is that these descriptions, often opposed to classical records, are based directly upon personal clinical analyses as conscientious and full of detail as possible.

M. Léri has had the excellent idea of devoting a special chapter to a sort of general review of the organic lesions following shell explosions at close quarters. To the facts recorded by Ravaut, Guillain, Souques, etc., he adds the contribution of his observations and personal ideas as much from the clinical, as from the anatomo-pathological and pathogenic point of view. This chapter in reality contains the justification of the preceding ones, and is, as it were, the proof of the opinions given therein.

The last chapter, devoted to treatment and medico-military decisions, shows the importance of differentiating between commotions and emotions, as well as of cerebral contusions, as much at the extreme front as at the base and inland.

This volume is not only addressed to neurologists and psychiatrists, it concerns all medical practitioners who, of whatever degree, are, at some period or another, called upon to examine and treat these innumerable wounded without wounds, and to decide whether they are commotional, emotional or cerebral contusional patients.

M. Léri lived his book for nearly four years before writing it, hence its truthfulness. Better still, it is a work of equity. Indeed, thanks to him, every one will be put in the place that belongs to him. On the one hand, despite the moving and too often almost romantic appearance of their complaints, simple functional and exaggerating patients must

not be indefinitely relieved, of military service. On the other hand, those poor devils of commotional patients with organic lesions, the cerebrally contused, whose ordinary depression at first sight is far from inspiring an equal degree of commiseration as those who do not know, will in future be entitled to all the respect and all the deference that the condition of their nervous centres commands.

In this respect M. Léry's book is entitled to bear as an epigraph the well-known verse of the Psalmist :—

“He hath flung down the mighty from their seats
And hath exalted the humble and meek.”

PIERRE MARIE

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SHELL SHOCK

COMMOTIONAL AND EMOTIONAL ASPECTS

CHAPTER I

INTRODUCTION

CERTAIN affections have an unfortunate destiny. Although fairly well-defined clinical entities, as a rule their pathological anatomy is not very accurate and, owing to their transitory and curable character, the more or less vast chapter of pathology in which they are comprised is allowed to stand over; their name especially serves to disguise the absence of diagnosis by means of a word. But medical literature ignores this word, wrongly diverted from its original significance, and only retained in its proper meaning by the profane.

Cerebral or cerebro-spinal commotion is included; the silence of the majority of modern classical manuals on the subject is surprising, when compared with the numerous articles devoted to it before the war and the large number of so-called cases of shock thronging surgical clinics set apart for accidents, especially those the result of industry. Every effect of an accident involving the brain or spine, whether the consequence or not of the traumatism itself, is classed as commotion, and treated and indemnified

fied as such. The medical man would be no less embarrassed than the judge, if compelled to define the commotion and specify by what process it had given rise to such and such persistent sequellæ.

The volcano upon which all men of military age have been living for the last four years should have been specially favourable ground for solving this problem. Indeed, the purest type of true commotion observed is that due to a shell bursting at close range, which is undoubtedly organic and free from all possibility of contusion.

But great is the power of routine ; so great that to this clear picture of true and pure commotion, the best authors considered they should include and merge emotional and exclusively hysterical disturbances, under the same description and denomination. They probably hardly perceived that, in contradistinction to commotional troubles, these symptoms are absolutely analogous to those which can be, and are, produced frequently in the absence of any direct or indirect shock, of any fall, bursting of shells, or of any commotion. Consequently, most of these cases may be instantly cured by carefully administered psychotherapy, and are certainly not attributable to organic lesions.

Must one believe that the time for dissociation has not come ? Everything was commotion that was not a wound. The word commotion on a military hospital card had a value almost equal to that of fever or injury, which figures systematically on the admission cards of all medical and surgical patients in our Parisian civil hospitals, even when there is no rise of temperature and the case is merely a simple sprain or dislocation. Field-ambulances and

military hospitals were overloaded with these cases of commotion.

The convenience of the word appealed to the surgeons at the extreme Front, who were generally young, with little inclination to probe the mysteries of neurology, and naturally ready to estimate the importance of a disturbance by its noisy character. Further, even supposing they had possessed the competency which could not reasonably be expected of them, they would hardly ever have had time to apply their knowledge in the rush of a clearing station in the front line at the moment of an attack. A card was filled up at once; when it did not mention a wound in such and such a region, it almost invariably stated: "commotion from the bursting of a shell." While to the surgeon this was merely a simple provisional diagnosis, such a card of admission, from that time the property of the soldier, at once became a weapon in his hands, acting as a counter suggestion to therapeutic treatment, all the more important in that the term commotion is always of serious significance in the mind of the public, as well as being a warranty for a subsequent claim. This is why we have demanded and obtained permission to forbid a diagnosis of cerebral or cerebro-spinal commotion to be written on a hospital card of admission, until the patient has been examined by a specialist.

But at the base another difficulty presented itself: the surgeons were ignorant of the causal accident, of all the exact circumstances, the mode of appearance, and the nature of the preliminary trouble. They had nothing to aid them beyond the assertion of the patient, they had to rely on his

intelligence and good faith, even when his thoughts were already fixed upon the admission card, the profit he might derive from the accident, and the military consequences, such as home allowance, unfitness, gratuity, and half-pay. It is far too common an error to regard pathological manifestations as the result of commotion alone, to judge them by themselves, without taking into account carefully the conditions under which they were produced. In order to recognise these conditions and judge of them very accurately, it is advisable to know even the locality of the accident, and to have time and means for making a detailed inquiry, the curriculum, as it were, of each particular case.

Two so-called commotional patients at first sight present quite different symptoms: each, however, will describe an identical accident; each, after the shell burst, at once became unconscious and did not regain consciousness for several hours or days after. It is not surprising that the surgeon should classify them both under the same heading—commotion from the bursting of a shell. But do not let yourself be imposed upon by preliminary data; take time to question your patients, remind them of certain details, either of the accident itself, or of the course of their evacuation, obtain their confidence, and recall certain memories, which are only blunted, and thus all the easier to recall as they are recent. You will then find, with surprise that one of them was too far from the shell for real commotion, that he did not lose consciousness, but remembered all the details of the accident and of the evacuation, although a few instants previously he believed, in good faith, that he was completely ignorant of them.

Of these two patients one really had had a commotional shock; the other had only had an emotional one.

Are they both presented in the same way? If one is to believe nearly all descriptions, commotions and emotions have the same symptomatology and the same consequences, and it is by subtlety that we differentiate them. We have no theory or psycho-physiological consideration which demonstrates their wholly theoretical nature; but we do not accept the patients' statements. We make a point in every case of making a close inquiry, of which we have given a short example. In nine cases out of ten, such inquiry is not necessary to enable us to conclude that the commotional condition and the emotional one are wholly different at all periods of the trouble, especially during the early stages. By the manifestations present alone we can almost determine in advance the nature of the accident which brought the patients to us.

Having been in charge for more than three years, first of a Neurological Centre at the base, and then of a Neurological Centre in the army, we have had the good fortune of being able to watch soldiers from the front line and clearing station down to inland hospitals. We examined them without bias, and kept them as long as necessary in a field hospital, far enough from the lines, to enable us to make a detailed examination, but still near enough for evacuation a few hours after the accident. Thus the patients came to us first hand, free from any medical or extra-medical suggestion.

These particularly favourable circumstances have enabled us to determine clearly the part of the

commotion and to separate it from everything relating to emotion, hysteria, etc.

The task has been an easy one ; science, it is said, is nothing but a perpetual renovation : it is partly in the description of old authors that we have found the most truthful picture of cerebral commotion or cerebral-spinal commotion. Modern writers have complicated this picture² by factitious discoveries and unjustifiable additions. This is the picture we have had to clean, revise, and renovate by the light of a pitiless multitude of new facts, which¹ almost blind a sincere and impartial observer.

¹ This book having been written whilst we served in the Army, is essentially based upon our personal observations and does not pretend in any way to be a complete bibliographical document.

CHAPTER II

HISTORICAL SURVEY AND DEFINITION OF THE SUBJECT

A COMMOTION is a transmitted concussion. This is the etymological sense of the word, *cum movere* ; the sense in which it was used in describing cerebral and medullary commotions. It is the meaning which ought never to have been lost and would not have been if, like many other affections, the description of hysterical disease had not been angrily resented.

According to classical authors, long before the present war, a cerebral commotion is produced by two conditions :—

(1) Either the individual receives a blow on the head or falls on the cranium ; the concussion being directly transmitted by the osseous cranium : this is direct commotion ;

(2) Or the individual falls from a greater or less height on the buttock, knees, or feet ; the concussion is not only transmitted by the cranium, but first of all by other parts of the trunk, spine, and bones of the lower limbs : this is indirect commotion.

In both cases, the cerebral commotion gives rise to a series of nervous troubles, characterized by the sudden and more or less complete stoppage of the cerebral functions : abolition or diminution of the intellectual faculties and of the vital functions

of relation, sensibility, and movement, combined with diminution of the functions of nutrition (Gosselin). 'There may be a grave, even an overwhelming commotion, with rapid death from cardiac and respiratory syncope; but in an ordinary commotion, owing to the cerebral concussion not being direct, but only transmitted, the lesions are slight, microscopic, and if not always of a mild appearance, the troubles are at least always transitory.'

The same etiological and clinical considerations apply *mutatis mutandis* to medullary commotions, and to the paraplegias or quadriplegias to which they may give rise.

These ideas, which are already very old, must be advanced to participate in the fluctuations of many chapters of nervous pathology.

Owing to the fact that a trouble is transitory, there is a tendency to consider it as purely functional if it is not clearly proved anatomically. Now, in diagnosing a cerebral commotion, the evolution of which was generally transitory, no allowance was made for microscopic lesions. Indeed, under the name of cerebral contusions, all those cases were classed in which anatomical examination revealed either meningeal or cortical hæmorrhage (hæmorrhagic contusion), or a superficial defect of the cerebral substance (destructive contusion). These cases can only be distinguished clinically from commotion by means of the possible addition of some sign of localization to the more or less diffused cerebral symptoms of concussion. With regard to the lesions of pure commotion, they were only microscopic, and were nearly always shown only by animal experiment, for men do not die from a pure commotion; they were

therefore, not proved, and from there it is only a step to regarding them as non-existent.

There is evidence to show that certain commotional troubles had nothing to do with simulation. Charcot's description of hysteria as an autonomous, general disease, capable of every kind of simulation, was appropriate; all so-called commotional troubles were grouped indiscriminately under hysteria (1878). It must be acknowledged that this was to a great extent just, for numerous troubles had been attributed to commotional traumatism, when they might quite as well have been produced without any traumatism, and were obviously dependent, not on the commotion itself, which was often hypothetical, but on the isolated traumatic or post-traumatic emotion. Unfortunately this was carried too far: disturbances probably of organic character, and others that were almost certainly functional, were all absorbed by hysteria; the vague and somewhat mysterious character of the new neurosis was so convenient and attractive to seekers after classifications! In the case of commotions, as with many other affections, hysteria ran up against failure in classification: it passed the goal!

On the other hand, certain authors, especially Oppenheim, described an affection under the name of traumatic neurosis (1885, 1889, 1898), the denomination of which in itself was sufficient to prevent its comprehension and diffusion in France. Indeed, the word neurosis does not convey to the German mind, as it does to the French, the idea that there are no lesions; consequently, traumatic neurosis indicates lesions, at any rate microscopic, which are not sensibly different from those already de-

scribed under commotion. This description had a very serious defect; it again, as it were, passed the goal, although in an inverse sense. By the side of commotional troubles properly so-called, it again enclosed within the same organic frame a certain number of morbid manifestations which had been justly grouped under hysteria. It was to a great extent a retreat instead of an advance.

The memorable researches of Babinski (5),¹ on the dismemberment of traditional hysteria, taught us to no longer regard it as a clinical entity capable of simulating anything, but instead as a more or less constitutional or acquired psychical condition, like a special suggestibility capable only of determining the disorder which the will can produce under certain influences such as an emotion. In reality, hysteria was absolutely incapable of truly simulating anything, except simulation itself. The persistent search for any small signs of organic lesions in the majority of cases, which up till then had been doubtful, enabled Babinski to supply us with the elements of differential diagnosis between organic lesions and purely functional troubles, whether hysterical or simulated.

Babinski's researches had a considerable effect on nearly all branches of nervous pathology. Nevertheless, they did not appear to have the same decisive, beneficent and eliminatory action upon the symptomatology of cerebral or medullary commotion, on the classifications of the troubles caused, or on their diagnosis. Why was it that a commotion remained a *caput mortuum* of nervous, as of general, pathology?

¹ The figures interpolated in the text correspond to the numbers of the Bibliographical Index found at the end of the volume.

This is doubtless because pure commotional lesions were almost entirely microscopic and experimental, and consequently had to be accepted with caution; doubtless, also, because it is easier to change the sense of a word than to restore its primitive, clear, and precise signification, which has been lost sight of.

Whatever the cause, the majority of articles on the subject of commotions, in their general description persistently confuse troubles of organic origin and manifestations obviously of a functional order.

The majority of authors made no allusion to this confusion; others recognised it, and spoke of hysterorganic associations. This was begging the question by a tentative artifice of dissociation, which, it is true, a superposition of symptoms sometimes made rather embarrassing; it was not solving it. It was felt, there are true commotions which manifest themselves by troubles with a clearly organic substratum, such as immediate and complete loss of consciousness. But, as the disturbances are often superadded to manifestations in the production of which emotion produced by shock, or the hysterical suggestibility of the patient, play an obvious part, these accidents could not be plainly separated from the former. When the latter manifestations were produced alone, independently of all commotional trouble, even of any shock or fall capable of causing a genuine commotion, one still spoke of a cerebral commotion or a cerebro-spinal commotion.

This was the condition of affairs at the beginning of the war.

The present war has brought new elements into the question. In the first place, it has multiplied

the number of cases in which real commotion¹ of the brain or spinal cord may be diagnosed. Further, and above all, the use of powerful explosives in formerly unheard of and almost inconceivable quantities has given rise to pure commotional accidents, which have been, if one may so express oneself, one of the medical revelations of this war,¹ e.g. commotions due to the bursting of shells at close range.

Ravaut, Guillaïn, André Leri, etc., recorded observations upon soldiers who had had shells fall near them; they presented no external injury, nevertheless either blood was found in the cerebro-spinal fluid, or the signs of organic lesion of the nervous centres (hemiplegia, paraplegia, etc.). Lumbar puncture or the post-mortem caused this to be attributed to cerebral or spinal hæmorrhage, which was sometimes considerable. These facts were absolutely analogous to those cases, reported by various authors, where, under similar conditions, hæmorrhage was revealed of other organs besides these of the nervous centres, e.g., the lungs, pleura,

¹ As a matter of fact, a few analogous facts had been reported during the course of previous wars. Laurent (of Brussels) especially, in a note to the Académie des Sciences and in a record of the Balkan war (117), reported cases of "cerebro-spinal commotions" produced by war projectiles at a distance. In his *Précis de Chirurgie de Guerre*, which appeared within the first months of the European war, Delorme called the attention of surgeons to the "quasi new chapter" (55). But, on reading these facts, one finds how incongruous they are, for the accidents may be caused not only by shells, but also by bullets, and mixed with them are accounts of disturbances attributable to fatigue, simulation, or confusion, without allowing for phenomena obviously of a neuropathic order.

stomach, bladder, kidneys, etc. (Sencert, Leclercq, etc.). They were similar to numerous cases in which hæmorrhage of the ear appeared with or without rupture of the tympanum.

Amongst those *wounded without wounds*, as it were, there were very few instances in which a pure commotion could be clearly diagnosed, in which some direct or indirect shock might not have been produced, or a contusion from a fall or by the blow from a splinter, stone, or lump of earth, contemporaneously with the explosion or immediately afterwards. The cases specially concerned were those of auricular or visceral commotions, and only exceptionally medullary commotions.

As regards cases of cerebral commotion due to the bursting of shells, all those that have been published occurred with loss of consciousness, and, consequently, with a fall; in only two cases (Guillain, 87 and 95) was there no loss of consciousness. We ourselves, however, have observed two cases, to which we shall again refer later, in which the causative circumstances were such as to apparently leave no place for doubt; the explosion of a shell at close range had been the sole cause of the cerebral lesion, with hæmorrhage certainly in one case (128), and probably in the other (131) without a blow of any kind. Instead of weakening the value of the foregoing facts in any way, it seems to us that these observations greatly strengthen them.

Cases of this kind, upon the pathogenic interpretation of which we do not wish to insist for the moment, evidently constitute the purest type of commotion, that is to say, of transmitted concussion. Consequently they are of great importance from the

theoretical, as well as from the practical, point of view; indeed, they modify all that we know about the nature and effect of commotions. Formerly, when the word commotion was used, it was meant to imply troubles that were generally slight, and, above all, always transitory, probably due to minute lesions, of a histological character. But, if pure commotion is capable of causing considerable visceral, cerebral, and medullary hæmorrhage, it ceases altogether to be a mild or passing disturbance; the gravest and most lasting manifestations may be attributed to it.

We have stated that convincing facts of grave and purely commotional disturbances are rare; so that it is with very justifiable reserve that Guillaín, Ballet, etc., have entitled their observations: Accidents "from the bursting of a shell without exterior wound." Unfortunately, this scientific doctrine had but few exponents. Rare as they were, certain examples were clear, striking, and a little revolutionary; and their repetition was such that the term commotion was almost synonymous with the explosion of a shell at close range. All the varied and innumerable causes of direct or indirect shocks, falls and contusions were neglected. Then, as the explosion itself alone could produce grave accidents, all the more or less serious accidents occurring in the zone of artillery activity were attributed to it, when there was no evidence of a wound to reveal its nature at once.¹

¹ Sometimes, indeed too often, during battles when the clearing stations were overflowing, we have seen unfortunate wounded arrive at our Neurological Centre armed with a card inscribed "commotion." The idea, too often prevalent, as to

It was rather a far cry, but nearly all the fresh evidence gave an organic basis to commotion. One might believe that this revelation would, at least, have cleared away from the clinical picture of the commotion the parasitism of all purely functional, emotional, or pithiatic troubles, in the genesis of which emotion played an occasional, if not a determinative, part.

But it did nothing: all manifestations, whether clearly neuropathic or psychopathic, the causation of which might seem to have any relation with a "marmitage" at more or less close range and of larger or smaller calibre, were baptized "commotions due to the explosion of shells," giving them the same title as true commotions and contusions, such as deaf-mutism, paralyses, contractures, hysterical rigors, convulsive attacks, etc.

The unforeseen symptoms which lent to the unsteady clinical entity of the commotion an aftermath of prestige and a lustre of actuality unfortunately led to a fresh mingling of most incongruous organic and functional symptoms.

• But, one might ask, is not emotion capable of causing certain grave symptoms of the same kind as commotion, particularly cerebral hæmorrhage? Seeing that, as a rule, there are but few commotions without a certain emotion, how is one to discriminate which part belongs to the one, and which to the other? Even in cases where the dissociation of

the frequency, gravity, and polymorphism of commotions was responsible for the wound not being searched for and discovered, despite the fact that its points of entrance and exit could have been seen quite well.

facts is perfectly justified from the etiological view point—for there are emotions without commotions—even in the cases in which there is no question of such serious lesions as cerebral hæmorrhage, how is it possible to justify the distinction between commotional and emotional phenomena from the clinical view point? Are they not both identical? Can we distinguish a commotional condition from an emotional one on the field of battle, at the clearing-station, in a field hospital at the front, or in a base hospital? Is it, indeed, necessary to distinguish the one from the other? Will treatment, evolution, or prognosis undergo any alteration?

The reply to all these questions is in the affirmative. As dualists we resolutely oppose the unicists, who confuse commotion and emotion under one description and the same designation, and do not believe it is possible to separate them practically from each other. Unicists, for the time, appear to dominate by their number. We believe on the battle-field there is a difference between the behaviour of commotional and of emotional cases. We believe they may both of them suffer from cerebral hæmorrhage; perhaps the hæmorrhage may be the same, although, as we say, certain vessels appear to be peculiarly subject to rupture in commotions and certain other arteries in emotions. But in one case hæmorrhagic concussion will appear to be the result of the cerebral concussion itself, or of special and momentary causes of local congestion; in the other case, the hæmorrhage will be the result of a vascular predisposition. The symptoms caused by commotions and those produced by emotions are very often capable of dissociation the one from the

other, at the end of a few moments, after the patient has been evacuated, and the sequelæ even will often be of quite a different character. Finally, it is necessary to recognise these differences, for the treatment of these various troubles is not less dissimilar than their general evolution, and their immediate or delayed prognosis.

Thus, it is from an essentially practical standpoint that, in the following pages, we shall attempt to distinguish between what is due to a true commotion and what depends upon an emotion solely, basing our opinion upon our own observations. We shall see how much more frequent emotional cases are than true commotional ones, and why it seems to us so regrettable that this latter term should have been so much abused. By the way, we shall attempt to indicate what may happen in the various accidents due to cerebral contusion, which also has a fairly distinct symptomatology.

We must not forget that there are commotions due to direct or indirect shock, and there is no doubt there are very many more of these than of genuine commotions due solely to detonation of an explosive. As these last, however, are the purest, the most unquestionable to-day, and, unfortunately, those of greatest present interest, it is to these we shall specially direct our attention, and which we have in mind when we add any other qualification to the word commotion.

In the first chapter we shall give a sketch of the essential CAUSES of these commotions due to explosion.

Then we shall describe the differential symptomatology presented by the commotional, con-

tusional, and emotional patients from the point of view of their MENTAL AND PHYSICAL STATES. We shall follow them through the three halting stages in each of which numbers of them are held up, viz., on the field of battle and at the clearing-station, in a field hospital or in the rest zones, at a base hospital, or more correctly within the inland zone.

Finally, we shall give descriptive sketches :—.

(1) Of the genuine MENTAL AFFECTIONS, which may succeed commotions or emotions ;

(2) Of the HYSTERICAL or pithiatic, TROUBLES which so often apparently complicate the picture of symptoms caused by the explosion of projectiles, troubles which might equally well be the consequence of any kind of a somewhat keen emotion, without any explosion.

We shall then give a brief general review of the clinical observations of FOCAL LESIONS, specially medullary and cerebral hæmorrhages, which have been diagnosed as the result of commotions due to explosion, without exterior wound.

In order to keep the observed facts recorded in the earlier chapters distinctly separate from all hypothesis and theory, we shall reserve a special chapter for a rapid account of ANATOMICAL LESIONS, induced by commotion, which are so far but little known, and for PATHOGENIC DISCUSSION with regard to the mode of production of these microscopic or macroscopic lesions.

Finally, the last chapter will enable us to understand the importance of knowing how to differentiate between commotional and emotional troubles, for we shall see that in each of their stages they

require entirely different TREATMENT, and a special prognosis entailing essentially dissimilar MILITARY CONSEQUENCES as regards unfitness, gratuity, and half-pay.

CHAPTER III

ORIGIN OF COMMOTIONS

COMMOTIONS of the nervous centres, from direct or indirect shock, due to the conditions of war, are innumerable: they only differ from those of civil life because, as a rule, the fall of a shell has been the indirect cause of the shock. In these cases, indeed, the shell is only an indirect—as it were mediate—cause; whether the fall of the patient was due to an explosion or not, or the injury caused by the collapse of a shelter, it is always by a fall or blow on the head, back or feet that the brain or medulla is affected by shock, by a disturbance passing through the osseous cranium. War has brought no new element to this common variety of commotion, other than its frequency and special intensity.

All others are commotions from pure explosion. The enormous development of heavy artillery and the use of charges of explosives never before employed in shells of large calibre, have considerably increased the frequency. In these cases the explosive, if one may say so, is the direct and immediate cause of the concussion of the nervous centres, as the cerebral or medullary injury, extending to hæmorrhage, is produced in the absence of any shock or fall on the head, back, or any part of the body.

A few figures will give some idea of the enormous

growth in explosive charges, which has been the new feature of this campaign, brought about by the transport on to the battlefield of large guns previously reserved exclusively for siege warfare.

A German 77 shell, weighing 7·175 kgr., at the beginning of the war only contained 0·165 kgr. of tolite, and a French 75 shell contained 0·825 kgr. of melinite. But the 130 and 150 cannon, which have been used by the Germans from the first, sent to a distance of 14 or 15 kilometres shells weighing 50 and 40 kilos, and containing respectively 3·270 kgr. and 4 kgr. of explosive. The heavy 150 howitzer commonly used was charged with 4·800 kgr. of picric acid.

As to the mortars, intended, it is true, for the destruction of large works in the country, the German 210 and 280 calibres discharged projectiles containing 16 kilos and 17·250 kgr. of explosive; the Austrian 305 mortar was charged with a 417 kilos projectile, containing 37 kilos of explosive and, more recently, up to 60 kilos. We only speak from memory of the famous 420 mortar, the great surprise of the campaign, which sent a 930 shell charged with 110 kilos of explosive to the distance of 13 kilometres, but, owing to their number being limited, they were only used against certain powerful fortifications.

At the commencement, the Germans had 232 heavy batteries, say about 900 guns. We were only able to reply to this heavy artillery by about 150 guns, carrying a short distance of 6·300 km.; the shells were charged with 10·200 kgr. of melinite. One can understand that commotions, no less than emotions, were more severe in our camp than in

the enemy's, a fact the Germans hastened to attribute to the neuropathic and psychopathic predispositions of the Latin race, in contrast to the nervous and mental resistance given to the Germanic race by their culture and superior education.

The Germans became less pretentious in this and many other directions as we successfully made up the deficiency. They multiplied their guns, and in May 1916 had placed 1474 batteries, of which 411 were on the eastern front and 1063 on the western, that is more than 4000 guns on the western front. But from then they were overtaken by the number of cannon of the Allied Franco-English artillery. With regard to power their guns had varied but little, whereas ours soon surpassed theirs, as, for instance, a certain gun, which first appeared in Artois in 1915, with 500 kilos shells charged with 150 kilos of melinite ! Since then the German race does not appear to have had the same superiority from a neuropathic point of view.

The great mortars are destined specially for the destruction of large fortified works ; further, it is not they which have caused the greatest number of commotions amongst the troops, although in September 1916 they constituted 24 per cent. of the heavy German artillery. On the contrary, the trench artillery yields nothing in power to the largest mortars.

As a rule the minenwerfern do not carry far—less than 1 kilometre ; but the projectiles used are the aerial torpedoes, which have been recently so much discussed in the army. They are winged shells, which a trench cannon sends up nearly ver-

ically 4000 or 5000 metres, and which, descending owing to their own weight, explode on touching the ground. Their casing, the mischievous effect of which is manifested by the multiplicity of splinters, is relatively thin, but the content in explosive is relatively considerable. The light mine used by the Germans (75 minenwerfer) contains 0.600 kgr. of explosive, with a total weight of 4.600 kgr.; the medium mine (170 calibre) contains 13.500 kgr. for a projectile of 50 kilos; the heavy mine, used at present (245 calibre) weighs 100 kilos, and does not contain less than 50 kilos of explosive. These are the large torpedoes the artillery men designate by the fancy name of "valises," which well indicates the slight importance of the cover compared with the contents. It is needless to add that, far from remaining behind, we now reply to German trench artillery not only by 240 torpedoes containing 50 kilos, but also 340 ones charged with 140 kilos of cheddite.

Torpedoes are among the most redoubtable instruments of the foot-soldier in stationary warfare; and they are, according to our observations, the direct cause of half the cases of true and grave commotions.

From torpedoes we pass on to flying bombs, which have an almost analogous action, but happily are much more limited in quantity. In the present war the Germans have mostly used small bombs, with a 7 kilos charge, specially dangerous owing to the very wide range of their explosion, and very destructive large bombs charged with 28 kilos of explosive.

In order to estimate the commotional value these

enormous charges may have, it suffices to know that the smashing explosives contained in modern shells are instantly transformed into a mass of gas which attains 27,000 times the initial volume in the case of fulminate of mercury, and 9000 times with nitro-glycerine. This mass of gas forms instantly in the space occupied by the explosive and develops a pressure which with the 'most powerful explosives, may reach 35,000 kilogr. per centimetre.' Under the influence of this pressure, the steel walls of the projectiles are not only broken, but torn, twisted, and smashed to pieces, the inner surface of the metal becoming compressed and hardened against the outer metal (Hudson Maxim (175)). After being released from the case, the gases become distended with formidable violence and are communicated to the surrounding atmosphere with such pressure and rapidity that the same destructive effects are produced as if they were solid, trees are torn up and stripped, rocks blasted, etc. This is the reason the explosive is known as smashing [Painlevé (191)]. Is it surprising that this atmosphere, which is as if it were solid, may also have a commotional effect on the brain and spine? The above sentence, written before the present war, contains the germ of all explanations of commotions from the bursting of shells.

The violence of these high explosives explains why it is not necessary for them to make a loud report in order to cause true commotional results; the only necessary condition is the immediate proximity of the explosion. This occurred in one of the first well-authenticated cases of internal lesion from explosion during the war, reported by Leclercq

(118), viz., that of a soldier by whose side an ordinary German 77 shell fell. It was so near that his face was covered by grains of powder; he died in a condition of shock at the end of forty-eight hours. There was congestion of the abdominal and thoracic organs, slight hæmorrhage of the intestine, mesentery and momentum, Tardieu's spots on the pleura and pericardium; finally rupture of the tunica intima of the aorta with thrombosis and sanguinary infiltration of the posterior mediastinum.

Now, at that time the 77 shell was still charged with only 0.165 kgr. of tolite.¹ A shell of that size is much more likely now to be capable of causing a commotion, seeing that its charge has been considerably increased. In 1914 its charge was increased to 0.210 kgr., in 1915 to 0.370 kgr., and in 1916 to 0.920 kgr. With far greater reason, our 75 shell, charged from the beginning with 0.825 kgr. of melinite, may cause commotional symptoms.

There is no doubt that these commotions may sometimes not only affect the thoracic and abdominal organs, but also the central nervous system through its osseous case.

• Nevertheless, referring to our own observations, we doubt if these commotions from shells of small calibre are really very frequent, apart from any fall or shock.

We must take care not to attribute to cerebral commotion the innumerable cases everyone is reported to have seen at the beginning of the

¹ It even seems that certain symptoms described by the Germans under the name of Grenade Neurosis (at a period when we only used hand grenades to reply to their heavy artillery) must sometimes have been real commotions.

war, where a German, in the proximity of an exploding 75 shell, which did not actually touch him, died suddenly in the position he was occupying, without making the slightest movement. No doubt, as clinical and pathological examination will reveal to us, in commotional accidents, the bulb might be affected particularly in commotions, so that in extreme cases instantaneous death might be explained better as resulting from bulbar shock, than by diffuse nervous concussion, or the so-called massive absorption of gas to which it was at first attributed. It seems paradoxical to state that these so-called sudden deaths from explosion almost entirely disappeared just when our heavy shells of all calibres arrived, with an infinitely larger explosive charge, and with them our almost unique 75 shell. Is it not also surprising that these cases of sudden death were not observed at all amongst our own soldiers who, from the beginning, took so little heed of the enemy's large heavy cannon? ¹

¹ It is said that sanguinary suffusions of the scalp have often been noticed in patients who have died suddenly. This statement, made even by those ignorant of medicine, reminds us of an observation we made at the beginning of the war, which perhaps will throw some light on certain of these facts.

A soldier, evacuated to the interior, only showed a few symptoms of intellectual torpor, and it was easy to draw him out of this by shaking him lightly. He would then reply to questions in a perfectly correct manner, but with such annoyance that he might easily have been regarded as simulating. A thorough examination, however, revealed to us a Babinski sign on one side, without corresponding paralysis. Careful cranial investigation only showed quite a small lesion of the scalp, already almost cicatrized, situated on the same side as the extesion of the toes. A few days afterwards the temperature rose suddenly and the patient succumbed. At the post-mortem a bullet was .

Whatever the cause, the belief in sudden death from the simple explosion of a 75 shell, at any rate in the majority of cases, must be relegated to the domain of the numerous legends current at the beginning of the war.

If the bursting of a quantity of explosive, as small as that required for a 77 shell (1896 or 1914 model), is capable of causing internal lesions similar to those described by Leclercq, it is surprising that the detonation of such considerable masses of explosives as those needed for large shells does not appear to cause commotional accidents at a great distance. It seems rather that serious, pure commotional accidents, apart from emotional, hysterical, and other troubles, are only produced at a very limited distance from the explosion; at only a few metres, 2 or 3 metres for a shell of small calibre, 5 or 6 for a shell of medium calibre, and 8 or 10 at the most for a large one. The proximity of the explosion is a much more important factor than the amount of the explosive; the distance at which commotional effects are produced increases certainly with the charge, but only slightly and not at all in proportion to the charge.

The explanation is simple: When an explosive substance detonates against a hard body, or against no matter what kind of solid body placed in the open air, the pressure developed by resistance against this body rebounds in the direction of the weakest

found which, entering by the arch, had passed on and become lodged in the base of the brain of the opposite side, passing successively through the two hemispheres, and causing in the second the pyramidal lesion indicated by the single Babinski sign.

resistance, with more or less destructive effects,¹ as the quantity of gas produced is greater and the explosion more abrupt. The air is roughly forced by the gas along the whole length of the cone of explosion; the bed of air in immediate contact with the gases is projected by them, in the manner of a projectile. It is in this zone that solid bodies, for example walls or houses, may be destroyed and persons may be affected by a violent commotional attack, without being touched by any splinter from the projectile or any hard substance. But this really dangerous zone is very circumscribed; beyond it a wave of atmospheric compression is produced radiated by the explosion, a wave which spreads with the rapidity of sound, about 340 metres per second, on a radius sometimes of several kilometres. The molecular concussion it produces is sometimes sufficient to break materials as fragile as window glass, but is not sufficient to cause great damage to either buildings or individuals.

¹ Powerful modern smashing explosions have happily not produced all the formidable effects certain people thought them capable of. Hudson Maxim states that before the war it had been predicted that if, for example, 200 or 250 kilogrammes of dynamite were allowed to fall on a warship or fortification, the target would be completely destroyed by the explosion, and bombs of the same strength dropped on a town would be sufficient to reduce it almost to cinders. In a war with Germany, it was thought, Paris or London would soon be completely destroyed by Zeppelin bombs; events have not in any way confirmed these predictions. To destroy a warship, for example, it is not sufficient to throw an explosive on the hull or on the bridge. It would be necessary, by means of torpedoes, or large calibre shells with very thick walls, called rupture shells, to perforate the decks and not allow the projectile to burst until the interior of the ship has been reached.

Below the explosion cone the effects of the projectile are relatively small ; this is what makes trenches so important. A shell, falling on the parapet of the trench even, will detonate in the air, as it were ; if only the trench is of sufficient depth, it is rare for the occupants really to suffer from commotions. Nevertheless, we have observed some instances ; but, generally, one may say that a commotion is nearly always produced in the open air, at least if the shell does not fall right into the trench.

Now, apart from intense destructive and levelling firing, it is relatively rare for ordinary shells to burst in a trench, as they are projected by cannon which shoot in a curve. It is much more frequent with aerial torpedoes, which are used preferably in stationary warfare, these torpedoes descend vertically from their own weight, and are intended to explode at the bottom of the trench.

The slightest shelter appears to be an adequate protection against shell commotions, even if destroyed by the explosion. Provided one has not to do with a shell with a time fuse, a case which is relatively rare and reserved for special objects, the projectile bursts directly it touches the roof of the shelter ; the explosion cone is to be found above. Then the metallic walls of the shell, projected with considerable violence, may break through the roof and penetrate as far as the ground of the shelter, no matter how deep it is ; the sandbags and wood will fall in, the occupants be buried and get more or less violent contusions. Further, they may be more or less intoxicated and asphyxiated, either owing to remaining too long in an extremely confined atmosphere, or by the infiltration of carbon

oxide, a result of all explosive combustion, a heavy gas which tends to penetrate into all the fissures of the ground. But the explosion will have taken place above them, the cone will not have touched them, there will have been no true commotion from the explosion.

This statement may appear somewhat paradoxical, if one believes the stories of the wounded; many of them say the commotional condition has been caused by the fall of a shelter. If it is a question of direct commotion from shock to the cranium, the fact is possible. But, if one acquires the habit of going carefully into details both when making the inquiry and the examination, as we have done with the majority of our patients, it will be noticed that they present some more or less clear signs of cerebral contusion or of intoxication, although different from the patients suffering from true commotion from explosion. Only when the soldier is close to the door of the shelter and the shell falls before the opening, he may sometimes suffer from commotion without contusion.

Note also that the force of the atmospheric wave may appear to spend itself on the sides of the explosive cone even, as it were to smash itself against the slightest obstacle. This force is propelled in the direction where the least resistance is found; a simple and thin shelter wall appears effectively to protect the inmates from the effects of an explosion, even when quite near.

Further, for these different reasons, in summing up, one may say that commotion from explosion takes place especially in the open air, and at a short distance from the bursting of the projectile, which

is generally of large calibre. It is never produced in the trench, except when the shell, or, above all, the torpedo falls right into it; it is but exceptionally observed in the shelters: these are the conclusions to which our observations have led us.

It is for these reasons also that, despite the use of enormous charges of explosives, true commotions caused by shells are relatively rare; infinitely rarer than simple emotional troubles, with which many authors confuse them; infinitely rarer than the majority of medical men believe them to be, according to the accounts given in recent publications, which, however, are fully justified by their interest.

All we have just said applies also to three other varieties of explosion capable of causing considerable commotion, viz., explosions in munition depots, of ordnance guns, and of mines.

When a munition depot is blown up, shells explode in hundreds and thousands; everything is destroyed in the immediate neighbourhood, and one might expect that the number of commotional cases would be considerable; it is nothing of the kind. We have been with a very active army, where numerous large munition depots were blown up, and have hardly seen any grave commotions due to this cause. This assertion, apparently somewhat paradoxical, seems to us to be due to various causes.

In the first place, as in the case of explosions of isolated shells, although the gas EXPANDS itself in every direction and not only in the air, although the explosion cone may be larger it is nevertheless still fairly limited, as well as the adjacent bed of

air which is violently projected ; but on persons as well as objects, the destructive action really only takes place in the immediate vicinity of the explosion. With regard to this, Hudson Maxim mentions the catastrophe which occurred in the Port of New York on 30th July 1916. An enormous quantity of shrapnel and other munitions blew up ; their fragments fell in a rain of iron on the surrounding waters, wharves, ships, etc. Nevertheless, only a very small number of people were killed and the material damage done to the neighbouring houses and buildings of Jersey City, Manhattan, and Brooklyn was surprisingly small, with the exception of the broken glass. But the molecular concussion extended far, and there was almost a million of dollars loss in windows and plate glass alone in the city of New York (175).

In the second place, the force of the gases is broken against obstacles, as it were, and we have been told of certain cases in which, at the moment of the explosion of an immense depot, a whole series of wooden field barracks has been torn away and hurled violently to a distance ; none of the wounded in the barracks suffering from commotion.

In the third place, above all, in a munitions depot the shells are not capped ; thus their charge of powder deflagrates, it does not detonate. There is a vital difference between deflagration and detonation in the rapidity of the explosion,¹ consequently

¹ Deflagration is the progressive lighting from place to place by a continuous passage of fire ; this is what is produced when powder is lighted by means of a taper ; deflagration takes place at a rapidity of 50 centimetres to a metre per minute. Detonation is produced by a sort of explosive wave, a series of shocks and

the smashing effects of the explosives being sensibly proportionate to their explosive rapidity, in deflagration they lose the greater part of their power. At a given moment, without the intervention of any cap, the deflagration of an explosive may be transposed into detonation, if the temperature or pressure is increased sufficiently; the phenomenon goes off all at once.¹ But in a general way, an explosion at an ammunition depot does not reach its fullest extent until after a more or less prolonged period, during which the men in the immediate neighbourhood have time to escape.

It is doubtless for these reasons, and perhaps for

molecular concussions, in the manner of a sonorous wave; it takes place when one lights the powder or the explosive mass by the help of a detonating explosive, for example a cap of fulminate of mercury; detonation is almost instantaneous, as it takes place with the rapidity of 1300 metres per second for nitroglycerine, 2700 metres for dynamite, 6500 metres for melinite, 10,000 metres for panclostite, the most powerful of explosives. The charge of a gun or cannon which throws the projectile deflagrates; if it detonated it would burst the gun.

Deflagrating projectiles become relatively harmless, thus it is erroneous to call explosive commotions "commotions by deflagration of the explosive"; it should be "by detonation." The word detonation would convey to the minds of many people the idea of sound, of a sonorous wave. It is by a mistake, or rather excessive restriction, that commotions have been described as due to explosion of a shell, as the explosion of mines and cannon are amongst the frequent causes. Thus, it would be more appropriate to say commotion from explosion.

¹ This is what happens especially when a case of fulminate caps blows up; all the other cases of caps may burst at the same time, by influence, even if they are not in immediate contact with each other, and the shells may burst at the same time. In large depots these accidents are avoided as much as possible by removing the detonators of the projectiles.

others also, that depot explosions have apparently produced but few grave commotions. But, on the other hand, they are amongst the relatively frequent causes of serious emotional troubles, even in the case of persons at a distance, owing to the violent noise they make, the intense atmospheric concussion at a great distance, and the fact that being far away from the front they are unexpected, etc. From our observations, nervous depression, neuro-pathic permanent tremor, etc., have often an explosion at a munition depot for starting point.

The bursting of artillery guns is frequently the origin of grave commotions.

This was, unfortunately, a more frequent cause still at the beginning of the war, a period during which incomplete trials and hasty manufacture were bound to leave room for some imperfections. Indeed, a cannon does not burst, with rare exceptions, because it is cracked or of bad quality metal, but because the shell detonates before quitting the weapon. This is the case in very varied circumstances.¹

¹ This is the case, for example, when the fuse is too sensitive (particularly charge I.A, intended to burst before the shell touches the ground and to shoot beyond the projectile). When the shell, made ready by the shock of departure, is subjected to a second shock within the cannon (caused in a worn cannon by jarring against the metallic tracks made by previous projectiles). When the charge of the shell itself is too sensitive (bag of phosphorus intended to increase the visibility of the explosion, explosive mixtures, formed of melinite and the metal of the shell or, especially, of the fuse); or when too large a charge of powder in the cannon cartridge leaves inflammable gases and incandescent carbon refuse capable of causing detonation of the next shell, etc.

By detonation inside the cannon, that is to say almost inside the closed tube, the shell develops considerable pressure. We have given above certain figures to form an idea concerning, on the one hand, the volume of gas developed and the instantaneousness of the reaction, the essential elements of the power of explosives, and on the other hand, the pressure produced in a shell by this enormous and instantaneous release of gas. When the shell explodes inside the cannon, the force of gas increases when the cartridge charge detonates at the same time as that of the projectile and the resistance of the cannon walls is added to that of the walls of the shell. Obviously, there is neither bronze nor any kind of metal capable of resisting such pressure; the cannon opens, explodes, breaks in two, ten or a hundred pieces, which are projected to a distance.

As a rule the gases spread backwards towards the breech; and it is here the artillery men are stationed. Further, cannon explosions give rise to violent traumatism, even in the absence of any direct shock, and are not infrequent causes of true serious commotions.

• The explosions of mines are also frequent causes.

These are intended to blow up works or enemy trenches and must be very destructive. For this purpose it is not always necessary to use explosives very destructive by themselves, for the production of gas is very rapidly accelerated when temperature and pressure increase. It is sufficient that the mine tunnel should be deep enough, solidly sealed up and well lined with explosive; further black powder is often used instead of cheddite, which is much more powerful. The charges employed are

considerable ; 500 to 1000 kilos for small ranges of mines often arranged in series under the enemy trenches ; but when the ground becomes rocky, and the work of blowing up is most important, 10,000, 20,000, up to 40,000 kilos of explosives are not extraordinary charges.

It is obvious that, under the influence of such explosives, commotions in the vicinity are frequent and grave ; but, as with shell explosions and for the same reasons, these affect the more or less immediate vicinity.

Happily, however, these explosions, which frequently had grave consequences, have become more rare. The progress of the microphone, which enables the enemy to hear a mine being made, and the rapidity with which counter-shaft bores enable him to blow it up, have made mines almost more dangerous for those who wish to use them than for those for whom they are destined, and the result is that their employment has recently been almost entirely discontinued.

This rapid review of the origin of explosive commotions will only give some idea of the explosive forces employed. It will indicate why the surrounding atmosphere may act as if it were a solid body ; it will also show why, despite everything, true explosion commotions are not of such extreme frequency as one might expect.

In any case, there are relatively very few commotions from explosion to which cannot be added some direct or indirect commotion, from shock or fall, and very often some cerebral contusion. There are none either, which could have been produced

without some emotion, whether previous, immediate, or at least retrospective. Further, the clinical pictures of commotions are in reality nothing but a mixture of the most incongruous facts.

Cases of true emotion without commotion, on the other hand, are immensely frequent ; so much so, in fact, that if one can only obtain very few examples to describe purely commotional accidents, cases describing purely emotional accidents are very common.

As to the cases of true explosive commotion, we are at least enabled to distinguish them by the fact that they do not differ sensibly from the long-known commotions arising from shock or fall ; but their description has been extraordinarily obscured and improperly complicated in recent times.

In a close analysis of complicated cases, the "reaction" enables one to resolve the amalgam into its different elements, so varied indeed sometimes that it seems curious they should have been confused under one description.

This is the analysis we have attempted in the cases we have examined ; these are the elements of dissociation we have endeavoured to classify in the clinical descriptions of the following pages.

CHAPTER IV COMMOTIONAL, CONTUSIONAL, AND EMOTIONAL PATIENTS

A. ON THE FIELD OF BATTLE AND AT THE CLEARING STATION

THEIR MENTAL AND PHYSICAL CONDITIONS (IMMEDIATE SYMPTOMS)

I. COMMOTIONAL PATIENTS

COMMOTIONAL patients present varied clinical aspects ; the following being some of the types :—

1. A large shell bursts in the open air at the moment of an attack or a torpedo falls into a trench. A soldier is a few metres away ; he falls suddenly, is unconscious and may die at once without a gesture or cry, although he was not hit by any fragment.

This is what may be called a lightning commotion. The term is not a new one, but is the description given to the sudden or almost sudden death which occurred, for example, in certain industrial accidents, before anything was known about 'shell shock'.¹ It was attributed to cardiac or respiratory syncope,

¹ Cases of commotion with immediate death have also been reported in former warfare, for example in connection with the blowing up of the ramparts of Tuyen-Quan [Nimier and Laval (187)].

but this is only a first view explanation ; we shall discuss its pathogenesis later on.

These sudden deaths appeared to be particularly frequent at the beginning of the war, especially under the influence of our 75. We have stated, however, that we strongly doubt the authenticity of the majority of the cases ; we are convinced that, in most of them, there was at the same time an undetected wound.

Nevertheless, it seems sometimes a matter almost beyond dispute that immediate death may result solely from the effect of a big explosion without the patient being wounded. Thus, our colleague Beck can vouch for the following accident :—

A 90 cannon was partly camouflaged in a hollow of the ground, about 1 metre in depth and 4 metres in length ; on the left of the cannon was a light dug-out, containing four artillerymen seated side by side. A 210 shell fell into the little trench and burst to the right of the cannon, throwing it over to the left. Of the four men, the two nearest to the opening of the shelter were dead, still seated, their faces swollen and violaceous, blood pouring from their nostrils and ears ; they bore no wounds. The third man was completely obnubilated, immovable, although he was breathing well and replied to questions in monosyllables ; he was wounded in the arm ; he was taken into the open air, the wound dressed, and he was evacuated. The fourth man was at the bottom of the dug-out ; he also was brought out into the open air. He remained inert for a few seconds, then, while his comrade's wounds were being dressed, he got up suddenly and ran away as fast as his legs would carry him. Thus, side by

side, in proportion to the distance from the seat of the explosion, in a shelter only 1·50 metres deep, we got the picture of sudden death from commotion, then cases similar to those we are going to describe of commotion on the one hand and emotion on the other.

2. If cases of sudden death without wounds appear to be relatively rare, loss of consciousness, on the contrary, is the rule in commotional patients. It is immediate; the soldier falls, wherever he may happen to be, for example in the direct firing line of the barrage, and remains there without any thought for his safety. He is lifted up by the stretcher-bearers and taken to the dressing station, either on a stretcher or carried by the arms and legs. During transport, he is an inert mass, his legs and arms hanging and swinging, body collapsed, head oscillating, his chin on his chest.

On examination, he is found to be unconscious, dissolution complete, dorsal decubitus, atonic and flaccid, face pale or more, often violaceous; he often bleeds from the nose or ears. If a limb is raised, it falls again quickly from its own weight. The patient does not move even when pricked or pinched. He replies to no questions. The tendon reflexes of the four limbs are abolished or much diminished, the pupils are largely dilated and react very little to light, the pulse is slow and feeble, respiration prolonged or stertorous. The patient is often soiled with urine and faeces, sometimes by vomit.

This is, on the whole, a typical picture of complete coma, analogous to the coma of important cerebral hæmorrhage. It denotes absolute physical and

mental inertia, with inhibition of the motor functions and medullary reflexes, as well as of the governing sensory and intellectual cerebral functions; the functions of the vegetative life itself are retarded. This is complete and grave cerebro-medullary commotion.

This condition lasts from a few minutes to several hours, rarely twenty-four hours. It may terminate in death. Prolonged coma, which remains complete, gives rise to a very bad prognosis; the vital functions are extinguished in their turn, progressively, without awakening, without any sudden movement. However, serious as this clinical picture appears, it very often diminishes with remarkable celerity. At the end of a few hours the patient awakes, understands and moves; from this time he resembles the other type of commotional condition we are about to describe, and this development gives the best prognosis.

8. The other commotional patient has also fallen unconscious where he was, out in the open, in the danger zone, at the side of the exploded shell. He also has been taken up by stretcher-bearers and conducted to the dressing station. He has been neither easier to lift up nor to transport than the preceding case, and did not exert himself any more; but, so far from being a limp mass, a rag, he exhibited a certain rigidity, a certain physical bearing, though it would not have facilitated his transfer without the stretcher; his limbs were not flaccid, his head was not nodding.

At the dressing station he remains stretched out and appears quite as inert as the preceding patient. It is sometimes, nothing more than appearance:

if anyone moves his arm or leg, it does not fall back with the same abruptness; if he is pinched or pricked, he will grunt and withdraw the limb; if called to in a loud imperative voice, or his shoulder shaken, he will reply, though always slowly, laboriously, monotonously, in monosyllables, in stereotyped words, but always clearly and accurately, without confusion. Thus a patient replied to all questions by three words exclusively: 'head, shell, cold; but these were not used at hazard; he adapted them perfectly to the question asked.' The patient does not even open his eyes during the interrogation, and falls back into his torpor directly afterwards, as if his main endeavour is to do everything with the least possible effort. Sometimes, however, he will turn over on his side and curl himself up; or his limbs may be agitated by a few semi-convulsive tremors.

The tendon, patellar, Achilles, radial, and elbow reflexes are all very strong, full, especially very quick, and sometimes more or less unequal. The defensive reflexes are quick also, and the leg jerks back violently when the sole of the foot is tickled, or the foot and toes are rolled up.

As to the Babinski, Roselle, and Oberthür (210) signs, anyone who has examined a commotional patient carefully at the clearing station is always said to have found them. For our part, we have never tested this; it is true we have not searched for them at the clearing station itself, where investigation is generally most difficult, but we have examined a considerable number of commotional patients with this object a few hours after the accident; there has never been any extension of

the toes. Must one conclude that this sign has only appeared directly after the accident, or in specially grave cases, which were almost impossible to move? We know nothing and can only ask the question.

The pupils are nearly always dilated, but regular and generally equal; they react feebly to light. The pulse is fairly well marked, but it is slow, sometimes very slow, being 50 or 45, and even less. Respiration is retarded, long, fairly superficial, and above all abdominal.

Finally, this is not the picture of complete coma, at most it is only sub-coma. The inertia remains the dominant note, but it is less complete. Inhibition is more cerebral than medullary, if one may say so; the medullary automatism is found to be relatively liberated from cortical control, and that is what explains the exaggeration of the tendon reflexes and of the defensive reactions. It is, indeed, a rule that, in all cases in which diffuse inhibition of the nervous system is incomplete, medullary activity survives the cerebral; for example, in chloroform narcosis, the conscious voluntary, and then subconscious, movements disappear before the reflex movements, which do not become effaced until the period of complete resolution approaches; the return of mobility is accomplished in the inverse order.

As a rule this sub-coma does not last long; but disappears progressively at the end of some hours, only leaving behind an intellectual obtuseness and physical depression, analogous to those observed in the following type of commotion.

4. In this other commotional type, the patient also fell and remained where he was for a few

minutes, absolutely devoid of the instinct of self-preservation. He also was lifted up repeatedly by the stretcher-bearers, but was able to support himself a little on his legs and was brought to the dressing station by being held up under the arms; if not supported on the way, his weakness returned; all movement seemed very difficult, as if painful, and he apparently dragged a letter with every step.

He also, on reaching the station, remains inert in the corner where put. He was lying on his side, with legs drawn up, head rigid; he moaned voluntarily, and complained directly he was moved; replied at once when questioned; further, answered correctly and indicated his head ached. Nevertheless, he neither knew where he was, why he was there, nor what had happened to him. Directly questioning ceased, he fell back into his inertia and obtuseness, indifferent to everything going on around him. Pupils generally dilated and pulse retarded.

Ordinarily the patient comes out of this torpor fairly rapidly; but during several days at least, and frequently during several weeks, he will retain a certain degree of physical and mental inertia, fatigue in moving or thinking and absolute amnesia both of the accident itself and the whole period of torpor.

Often, however, these patients are not evacuated to a base hospital, because they will be well enough to return to the front after remaining a few days in one of the little "lame" depots, that the directors of medical service and the accredited divisional surgeons have learnt to organize at the time of an attack for the recuperation of fit men, in some little village fairly near the firing line and a little distance from any railway.

5. In all the preceding cases, there is immediate more or less complete and prolonged loss of consciousness; this is the rule in nervous commotion. But care must be taken not to regard it as a general rule and an absolute diagnostic sign. Indeed, a certain number of commotional patients, who were more or less stunned, but not thrown down, by a violent explosion at close range, have presented certain and evident lesions of the nervous centres without having lost consciousness at all.

These cases are specially important, because they serve best for demonstrating the existence of organic cerebral or medullary lesions, due only to the explosive windage. Indeed, in all cases where a soldier has been simply thrown down, or has lost consciousness, one may suspect concussion with a solid body to have contributed towards the production of the lesions.

Cases of medullary commotion with undoubted organic lesions, without loss of consciousness, have been recorded by Heitz (101), Joubert (107), Pierre Marie and Chatelin (169), Froment (76). We ourselves observed the following case: a soldier was standing when a shell burst behind him and threw him over; he was obnubilated, but did not lose consciousness; he was unable to get up and paraplegic; the paraplegia being clearly organic (129).

Cases of cerebral commotion with focal organic lesions, without loss of consciousness, are more rare. Thus, in Guillain's case (87), a chasseur (light infantry or cavalry man) was larking with three soldiers when a shell exploded in the middle of them and killed his three comrades; the chasseur was

not hit, was able to get up alone and walk ; but an hour later, for the first time in his life he had an attack of epilepsy ; subsequently these were repeated very frequently.

In another case of Guillain and Barré's (95), there was hemiplegia without loss of consciousness.

We ourselves have seen analogous cases, although still more typical. A soldier was riding ; a shell burst on his left and carried off his horse's head ; he fell leaning on his left hand, but his head was not struck and he got up again at once. One or two hours later, he has his first comitial attack, of Jacksonian character, affecting the right arm. The attacks recurred, one watched was clearly comitial. There must, therefore, have been a lesion of the cerebral cortex of the left side, that from which the shell came (126).

In another case, a soldier was lying down when a 210 shell burst to his left ; he got up instantly, although stunned and suffering from pain at the right side of his head, and resumed his occupation. Half an hour later complete left hemiplegia, of clearly organic origin, developed. He only then lost consciousness, not owing to the fact of the commotion itself, but to the cerebral hæmorrhage ; lumbar puncture drew out blood-stained fluid.

In the third case, an officer, on reconnoitring duty, found himself on a half-wrecked conduit ; simultaneously two shells burst (one probably a 105, the other a 150), the one on the parapet on the right, the other on the left parapet. He was thrown down and fell on his left arm, but his head was not struck, his statements with regard to this being as positive as those of the officers who accompanied

him, he did not lose consciousness at all and got up at once. Supported under the arms, he reached a commandant's station situated 30 metres distant. The following morning, being perfectly lucid, he assisted at an attack and followed the progress of his men through field glasses. But since the shock he has been quite incapable of speaking; it seems logical to think of mutism; therefore it is a surprising, but undeniable fact that there is no question of mutism, but of complete motor aphasia with agraphia (we shall return to this observation later on) (131). •

The reason we have attempted to give brief reports of these examples is that cases of this type are not numerous so far, and especially because they seemed very typical. They are the only cases we know of, in which one can state that not only has there been no exterior wound, but there has been neither fall, shock, nor loss of consciousness, and the organic cerebral lesion has certainly been due to the single explosion of a projectile at a distance.

To sum up, commotion from explosion may cause—

(1) Sudden or almost sudden death ;

(2) Loss of consciousness, followed either by complete more or less prolonged coma, curable or fatal, by sub-coma, or by simple obnubilation. These different conditions represent the variable degrees of physical and mental inertia, of cerebral and medullary inhibition; they may be nothing but successive phases of the same clinical picture. Mydriasis and bradycardia have appeared to us to be amongst the most general physical signs.

(3) Focal cerebral and medullary lesions, whether

isolated, as in simple contusions, or accompanied by loss of "consciousness and diffuse inhibitory troubles.

II. CONTUSIONAL PATIENTS ¹

As we regard the matter, it is altogether wrong that cerebral commotion should have been considered as similar to the first degree of contusion. Leaving absolutely on one side, for the moment, all comparison of anatomical lesions and all pathogenic theory, we assert that pure cerebral commotion is shown clinically as an inhibition, a diffuse lightning stroke of the encephalic functions, whereas pure cerebral contusion is presented under the form of localized troubles of deficiency or of cerebral irritation.

The syndrone of commotional inertia, coma, sub-coma, or physical or psychical obnubilation, appears to necessitate the more or less complete functional suspension of two cerebral hemispheres. Such is the case for the different varieties of comas; Pierie Marie and Kindberg have demonstrated this fact, especially as regards that condition of coma which may seem most unilateral in its origin, the coma of cerebral hæmorrhage (171).

Pure cerebral contusion may manifest itself quite differently; but as cerebral contusion is rarely pure this has caused a confusion of facts

¹ It is of course understood that, in this book, we shall use the name of contusional exclusively for those patients suffering from cerebral contusion.

and made analysis difficult. • This is specially the case in war contusions, which are nearly always particularly • violent. It is conceivable that when soldiers have been buried by the destruction of a dug-out or of a wall, have received blows on the head from stones and pieces of wood, been thrown in the air and fallen down on their skulls, they will not only present signs of localized contusion, but also of intense diffuse commotion of the entire brain. Further, it is often impossible to distinguish the contusional from the commotional case at the beginning; both are in a comatose or sub-comatose condition.

Ecchymosis and wounds of the scalp do not in any way constitute an absolute diagnostic sign, for, on the one hand, similar superficial lesions are often observed without any commotion or contusion, and on the other, sometimes at the post-mortem extensive hæmorrhagic or destructive contusions of the encephalon may be discovered without any ecchymosis of the scalp. Perhaps it would be more correct to use the term contusions from the explosion of shells, rather than commotions in connection with at least some of the symptoms, where the explosion of a shell has caused a local cerebral lesion, more or less cortical or sub-cortical, although there was neither fall nor shock from a solid body of any kind, and no form of cutaneous or osseous lesion was proved. The wind shock, of which we shall speak again later, may cause localized lesions like diffuse lesions, as though due to a blow with a solid body.

From the beginning, however, certain signs sometimes aid one to think of contusion; these are small signs of localized deficiency or of cerebral

irritation. For example, when the patient's arm or leg is raised, it will fall back again abruptly on one side and not on the other. Or the limbs may be rigid, or agitated by convulsive jerks or spasmodic tremors of one side only; again, the inertia may be interspersed with periods of motor agitation and mental excitement. Further, when the patient is questioned somewhat briskly, his replies are incoherent and confused, he is manifestly bewildered and delirious, sometimes being reduced to more or less unintelligent babbling, which at once reveals some trouble affecting the speech.

But the difference between the contusional and commotional patient is found specially in the symptoms displayed as he comes out of sub-coma or inertia. Then, as a general rule, the contusional patient is as much agitated physically and mentally as the commotional one is inert. Body rigid, head thrown back, grinding his teeth, he moves and turns unceasingly; the rigid limbs are often animated by irregular tremors or convulsive jerks, either localized or not, sometimes having the appearance of comitial, Jacksonian, or generalized attacks. The patient is delirious; with a calm delirium, though it is occasionally agitated or furious, in every case it is essentially diffuse, and the nature of the delirium is only regulated very superficially and incompletely by external events. Confusion as to time and space is often extreme. There is amnesia, not only with regard to the accident itself and subsequent events, but also sometimes as to more or less extensive periods of the previous life. Retro-antegrade amnesia is observed, with contusional patients especially, this being mitigated nearly

always in the calm periods by the occurrence of at least short intervals of correct memories. But, generally, these troubles of memory can be studied better and more leisurely in the field hospital; we shall refer to this again in the following chapter.

In conjunction with these phenomena of excitement, some sign of localized deficiency is sometimes found, for example, paralysis of a limb or portion of a limb, or some pronounced disturbance of speech.

Examination of the tendon reflexes shows them to be much and often unequally exaggerated; clonus of the foot or patella is not rare, neither is the sign of extension of the toes; the defensive reflexes are strong, Kernig's sign often very marked. The pupils are more frequently contracted than dilated. The pulse is ordinarily retarded.

If lumbar puncture is performed, not only is hypertension of the fluid found, as in simple commotions, but ordinarily a blood-stained, or at least markedly xanthochromic, fluid for a few days after the accident.

It is evident that this clinical picture has for substratum the irritation caused by superficial hæmorrhage, either cortical or meningeal; there may or may not also be some signs of depression caused by a deeper or more destructive lesion.

To this must be often added an element which so far has not been much in evidence, but which certainly plays a part in a number of cases of burial in dug-outs, or in the trenches destroyed by shells, namely, intoxication. Although not always evident, the causes of intoxication are nevertheless multiple. It is relatively rarely intoxication from asphyxiating gas shells, but much more frequently intoxi-

cation from carbon oxide,¹ which escapes always during a shell explosion and infiltrates through the cracks in the ground. It is sometimes auto-intoxication from uræmia or from glycæmia, and may be either the result of the previous intoxications, or of bulbar shock; auto-intoxications which albuminuria or glycosuria may reveal if looked for.

Here is an example showing how a contusional syndrome is presented without any precise sign of localization :—

Arnold, aged twenty-one, farmer, was completely buried alive, on the evening of 12th July, by an explosion caused by the bursting of a 150 shell on the parapet of the trench. Evacuated to a surgical field hospital, with the diagnosis: Fracture of spinal cord, condition comatose. He was sent three days later to the contagious diseases hospital, with the diagnosis: No fracture of the spinal cord, but stiffness of the neck, Kernig's sign, suspicion of cerebro-spinal meningitis. There it was found that he had no cerebro-spinal meningitis, and he was sent successively first to another surgical hospital, then to our Army Neurological Centre, where he arrived about eight days after the occurrence.

He was in a state of aberration and of evident confusion, and altogether bewildered as to time and space. He had a vague memory of his accident, but the account he gave of it was absolutely diffuse, inaccurate, and much more a dream and medley

¹ Long before the present war, toxic accidents in mine warfare had been studied, notably by Rigol and Rizet, and attributed essentially by a German commission to carbon oxide, which produces symptoms of serious intoxication with an admixture of three thousandth in the atmosphere breathed.

of recollections than reality. • He stated that when he was thrown down he was at the base, in a place where there was a cinema, in which he had to attend to the music. When aroused, his memory was not much better ; he looked in a surprised way at things and people, without appearing to recognize them. He could not find his way about the field hospital, and failed to recognize either his bed or the head orderly ; the only things he did know were his pipe and his knife.

Nevertheless, correctly speaking, he had not a single delirious idea. The evening he arrived at the field hospital, he insisted upon going into the village and there was difficulty in getting him to return and go to bed ; but it was merely a simple confusional disturbance without any violent agitation. The next day, he stated very quietly that he would like to go and see his mother ; further, he knew that his mother was in the Haute Pyrénées ; was aware that he himself was in hospital, and supposed he was probably at Toulouse. He thought he had been for a walk the previous day and probably went into the shops.

• He knew neither the day, month, nor place where he was, but did not worry about it at all. Although he spoke of a base camp, where he was thrown down, he had only a very vague idea as to there being a war ; he did not think he went further north than Toulouse, but perhaps he went to Paris ; he had not seen a particularly large number of soldiers about him. This was all said in quite a natural way, without either agitation or depression. He replied fairly well to any simple questions put to him, was quiet during the examination, but

always a little bewildered and with a certain temerity.

Very marked stiff neck, Kernig's sign evident, swayed a little in walking. Patellar, radial, and olecranal reflexes very strong, plantars flexed; no clonus of feet. Pupils of moderate size, equal and reacting well to light, perhaps a little weakly. No oculo-motor disturbances. Neither deformity nor vertebral pain. Complained of constant headache. During the first days his temperature went up to 38.5° ; fever then abated. Marked emaciation, pallor; ate little and very slowly; often passed urine in bed, but this did not trouble him.

Lumbar puncture yielded hypertense and markedly hæmorrhagic fluid.

The patient, who had become very difficult to keep in a neurological centre, where there could be neither isolation nor supervision, was sent at the end of a few days to a psychiatric centre.

There is no doubt that a certain number of cases reported by various authors must be included in the group of cerebral contusions, for example the following observation by Leriche : ¹—

V— was caught under a trench which fell in, as the result of the explosion of a large shell on 15th March. Having suffered from immediate hæmoptysis during coma on the 17th, he moaned although asleep. On the 18th, he was still quite stunned, stupefied; could not speak and did not understand what was said to him, but he could write a few words.

¹ Since 1915 Leriche (143) has justly spoken of "contusions from the windage of a bullet," but without clearly distinguishing these from commotions.

Pupil reflexes normal, patellar a little exaggerated. No phenomena of paralysis, but a certain degree of contracture of the limbs; genuine spasmodic attacks at certain moments. Lumbar puncture, fluid rose-coloured under strong tension. Improvement the following days, the patient spoke, but the phenomena of contracture continued.

In a personal observation, to which we shall refer later, the dysphasic disturbances were more prolonged and more pronounced than in the preceding case.

Other examples have been cited in which, as the result of a violent shock (often the explosion of a mine), symptoms of cerebral excitement have been observed, with or without certain symptoms of localization (paresis, dysphagia, etc.). The cerebrospinal fluid is generally coloured and when, by chance, it has been possible to make a post-mortem examination, meningeal or meningo-cortical hæmorrhage has been discovered (212, 40). These cases, as we regard them, have been contusion and not pure commotion.

If we insist upon this difference of symptomatology between pure commotion and cerebral contusion, although this is often accompanied by commotion, it is because it is not a question of simple confusion of words, but really a confusion of facts, not without serious consequences. Indeed, from the point of view of prognosis, as well as from the therapeutic standpoint, the two clinical pictures are of absolutely different significance.

Once the first hours have passed, and the condition of complete coma has ceased, the commotional patient, no matter how inert he may appear to be,

is generally affected in a mild and rapidly curable manner. On the other hand, the contusional patient is agitated and delirious, especially if alternately inert and excited (excited inertia paradoxically), and he is more or less paralyzed or aphasic. The contusional patient improves but slowly, only recovers very progressively, and the condition often has a fatal termination.

The contusional patient is very liable to a markedly serious disturbance as an after-effect, namely, infection of the meningo-encephalitic focus, a fatal complication which manifests itself, even in the absence of fracture of the skull, from the third to the sixth day, or sometimes later, with high temperature, rapid pulse, delirium, agitation, convulsions, etc.

From a therapeutic point of view, lumbar puncture, as we shall show, may produce beneficial results in cases of commotion, but it is in contusion that it has proved itself to be indispensable. In contusion also, more important interference may become an urgent necessity.

III. EMOTIONAL PATIENTS

The emotional patient presents quite a different appearance to the commotional one. Whether he has been in the more or less immediate vicinity of the explosion of a large shell, a torpedo, or mine, or has simply found himself at a good distance from the explosion of a gun of large or even of small calibre, or has been the witness, even at a distance, of some terrifying scene, in which explosives may have had no part, whether he has been knocked

down, or not, in any case he has not become unconscious. If he has fallen, he will get up after a time and, if he were going to the front, will return rapidly, running if he can, limping or stumbling along, and will arrive quite alone at the clearing station.

With haggard eye, pinched nose, pale face, and bewildered air, he will throw himself down in the most distant corner of the station, on the ground or a form, hiding himself there, shrinking and will not move again.

If examined, he pays no attention to what is being done; is trembling, rigid, and not very responsive; respiration laboured, pulse rapid and strong,¹ the pupils contracted if anything. The tendon reflexes are neither excessive nor diminished, the pupils react well to light, and the patient is not soiled with urine. . . .

If questioned, he does not reply to a single query, and has the appearance of not understanding, of being absent-minded. This is the patient who, the day after, or even later, at the field hospital or the base, will assert, certainly in good faith, that he lost consciousness and knew nothing; whereas, in reality, he did not lose consciousness, and, as we shall see, remembers everything perfectly; to obtain proof, it is only necessary to question him. Meanwhile, he only concentrates on his anguish,

¹ According to Pierre Ménard (179), tachycardia was nearly always observed in first-line trenches, apart from emotional shock, with weak maximal and minimal tensions; a violent emotion will raise the minimal tension considerably and the maximal very little. But these are precisely the characteristics that Biscons and Mercien (25) attribute to the tension of commotional cases in opposition to the emotional ones; it is evident that these terms are not yet sufficiently distinguished.

and is indifferent and inattentive to everything save what concerns the instinct of self-preservation and the idea of his own security.

Is confirmatory evidence of this desired? Never have these patients been seen to remain in any exposed place during barrage fire, nor to flee in the direction of the enemy. If a N.C.O. comes across their path capable of arresting them, they often do not hesitate to make threats, which, however, they do not carry out. It would be loss of time, they are too frightened for that, and moreover, their only idea is to flee, but that is absolute, no matter how courageous they may have seemed before. These threats are not exceptional, and the patients make no attempt to deny them, they simply state that they have no recollection of them; if they really did make them, this was no doubt owing to the commotion and the subsequent delirium! Truly, apart from the explanation, it seems that they are not wrong altogether, and are often not much more responsible in impulsive emotional disturbances than in commotional ones.

At the clearing station they do not settle themselves just by chance; they will watch the ceiling and the walls, and sometimes get up suddenly to change their position and obtain one of greater security. Du Roselle and Oberthür record the exclamation of a haggard commotional patient, incapable of replying a word, or of recognizing anyone, who, on arriving at the clearing station and recognizing the quite fresh traces of a shell, refused to advance a step, crying out: "No, major, I will not go in there, shells are falling now, those were not there yesterday!" (210).

If an injection of camphorated oil has to be given to these apparently atonic and inert patients, as is the rule for all so-called commotional cases, it is not necessary to push forward the piston of the syringe; it suffices to insert the needle to awaken them, and sometimes the response is very violent!

When the ambulance arrives for evacuating the wounded, these men, who appear to be incapable of any voluntary act, rush out at once, before there has been time to call to them, and take their places quite normally. If the ambulance cannot get right up to the station, it is only necessary for the corporal stretcher-bearer to ask the doctor what patients must be carried on a stretcher; all will at once reply that they can walk: one arrives much more quickly and can take cover much better on foot than on a stretcher!

It is the emotional type we are going to describe, the pure emotional, as it were. But even at the clearing station itself there may be manifested a series of hysterical phenomena: tears, cries, convulsive attacks, spasmodic or choreic tremors, paralysis, contractures, stammering, dumbness, etc. It is a remarkable fact that these manifestations are never produced unless the patient feels himself in relative security in a trench or a dug-out, and more especially in the clearing station. Further, these disturbances vanish like magic if the security is lessened, by the shelter being bombed, or if the ambulance is in sight. Very often one sees hysterical disturbances during the tense periods which precede attacks, for example, while the artillery preparation is in progress. This may occur even in perfectly *bona fide* cases, apart from deliberate

simulators and conscious malingerers. We do not wish here to dwell upon hysterical phenomena, to which we shall return later, but simply to draw attention for a moment to the preceding statement, which seems to us of paramount interest in appreciating the pathogenesis of hysterical disturbances.

It is by the addition of such and such a pithiatic symptom that each emotional patient, as it were, reacts in his own way and according to his own fancy; moreover, emotional varieties appear to be much more numerous than commotional ones. In reality, noisy phenomena are only variations; they are generally relatively late, never immediate, because relative security is necessary for their manifestation. The clinical picture of the emotional patient, freed from these additions of exuberance, which are sometimes disproportionate, has its individuality as has that of the commotional patient. It is because this very simple clinical picture has been misconstrued that symptomatic expressions have been misinterpreted, both in relation to immediate prognosis and the sequence to be expected, and also the means to be adopted to counteract them.

To summarize, on the field of battle the cerebral commotional patient is dominated by more or less absolute physical and mental inertia at first, which passes from complete coma to obnubilation and simple atony. (There are certain exceptional cases of focal lesions without loss of consciousness, the nature of which is doubtful.) The cerebral contusional war patient is generally commotional

at the same time, and the signs of commotion first predominate. But, after the disappearance of the commotion, or in default of it, the signs of cerebral contusion are either diffuse meningo-cortical irritation, physical and mental agitation, signs of irritation or of localized deficiency (convulsions, contractures, paralysis, aphasia, etc.). The emotional patient really loses neither consciousness, memory, nor the instinct of self-preservation. He is neither inert nor agitated, physically or mentally, except up to the point when his safety is not in danger; the most varied hysterical manifestations are frequent, although in no wise indispensable, accompaniments of emotional troubles, but only in a relatively safe shelter from danger.

At the clearing station, the emotional patient is, by far the most common, the contusional comes next; only four or five cases of true commotion are observed to a hundred of emotion.¹ Now, if the doctor has only limited power over commotional and contusional accidents, it is on him, on the other hand, that absolutely depends the evolution, duration, and prognosis of the majority of cases of emotional origin, notably the hysterical phenomena following emotions. The more immediate and energetic the treatment applied to these disturbances, the greater is the power of the doctor; a good divisional surgeon, a doctor at a clearing station, or a depot for the slightly wounded, if sufficiently cautioned, ought to be able to strangle hysteria in his entire division. It is well known that

¹ Cheyrou (41) has justice on his side, in recently insisting on the very small number of commotional cases in relation to the emotional ones, even during attacks.

nothing is so contagious as hysteria, especially at the present time.

Further, it is indispensable that, at the clearing station all cases should not be uniformly labelled as commotion, in the production of which an explosion or fall may have played a more or less direct part. It is necessary to distinguish from commotional cases the mass of emotional ones which, for the most part, should not go further towards the base than to a depot for the slightly wounded, who are not evacuated and recover quickly. It is even possible to make the distinction at the clearing station, and the treatment, upon which we shall insist later, can be applied at the hospital for the slightly wounded; which is where the best and most immediate results should be obtained. This is the reason we have tried to give an idea (perhaps somewhat sketchy, in places, owing to the possible superposition of morbid causes in practice, but correct for the majority of the patients), of the different clinical pictures which may present themselves at the clearing station in non-wounded cases.

CHAPTER V

COMMOTIONAL, CONTUSIONAL, AND EMOTIONAL PATIENTS

B. AT THE FIELD HOSPITAL

THEIR MENTAL AND PHYSICAL CONDITIONS (SECONDARY SYMPTOMS)

BETWEEN the halting place and the field hospital the syndromes often become less pure. The commotional patient, on coming to himself and regaining consciousness, cannot but be more or less emotional, when looking back upon the great danger he has escaped and anticipating further consequences, to which he may yet be subjected. The contusional patient, who is very often suffering more or less from commotion, becomes emotional in the same way. The emotional patient, who feels himself henceforth no longer in safety, has the whole of his physical and mental activity bent upon the instinct of self-preservation. He is now often simply utterly tired out, depressed and inhibited, thus resembling a commotional patient.

The admixture of morbid types is acknowledged; but all the same they retain in varying degree the reflection of the differential characters we attributed to them even at the time of the accident and which, to a certain point, justify the anatomical lesions so far proved or presumed. Further, these

characteristics having already been described, we shall give a briefer description of certain clinical pictures in the field hospital.

I. COMMOTIONAL PATIENTS

Commotional patients, who are brought to the field hospital some hours or days after the accident, are still mainly characterized by their inertia, with its two principal traits: physical asthenia and mental obtubilation.

Often brought on a stretcher, they get up when told to do so, and, supported under the arms, walk into the ward or upstairs, slowly, mechanically, like automata, as if they were out of their minds.

When in bed they remain stretched on their backs, or sometimes curled up on one side; move very little and then slowly and painfully, often as if ataxic or dysmetric. They remain in the position in which they are placed; cataleptic attitudes not being altogether exceptional.

Their eyes are sometimes open, but still atonic. They do not look at all surprised, do not know where they are, how long they have been there, or where they have come from, but do not appear to worry about it at all. Yet they know perfectly their name, age, regiment, native country, and profession; they have preserved all these facts, and can recall them almost automatically, no effort being required. When they speak they carefully give all information, without confusion, inco-ordination, or chaos in their ideas. Further, they sometimes know the year, month, and even day, and, as far as one can judge,

are not bewildered at all.¹ But to each and every question they only reply slowly, heavily, as if requiring much time to understand the question and recall their memory; they reply in a low and monotonous voice, with clipped words, in monosyllables, as if afraid of making any superfluous effort. Nothing seems either to worry them or arouse them from their torpor. They sleep when left to themselves.

The tendon reflexes are generally ample and strong, but without clonus either of the foot or patella; no extension of the toes. There is generally mydriasis of the pupils and feeble reaction to light; contraction to light is often followed by secondary dilatation, or by nystagmus of the iris denoting genuine iridian instability.²

The pulse is ordinarily slow, 60, 50, or less; but, as it is essentially instable, a whole series of varieties are observed; one patient's pulse was 48 on admission, and became normal the following days; another, owing to the sole fact of evacuation, had a very

¹ In a work published eighteen months ago (130), relying on the assertions of authors, we described mental confusion, with bewilderment and frequent hallucinatory dreams, as forming part of the commotional syndrome. Having now observed soldiers near the firing line, and moreover having minutely studied the exact circumstances of the occurrence, we are to-day convinced that it is not. The limitations of the commotional syndrome seemed to us much greater than they did to a number of authors, and to-day appear to us to be still further restricted.

² Guillaïn and Barré (97) have also verified these disturbances, and have sometimes seen them extend as far as the Argyll-Robertson sign or total abolition of the pupillary reflexes. At other times, they have noted the inequality of the pupils, either in diameter or intensity of reaction. Dufour (57) has seen a unilateral Argyll-Robertson sign after a woundless commotion.

rapid pulse on arrival, but it fell below 50 the next and subsequent days.

In all cases the pulse is feeble, heart beats badly marked, and the arterial maximal tension clearly below normal.¹ Mydriasis and bradycardia are amongst the most usual physical signs of the commotional syndrome.

These patients very often suffer from almost complete deafness, either uni- or bilateral, owing to commotion of the labyrinth, whether there is rupture of the tympanum or not, and with or without an effusion of blood into the auditory meatus. It is not unusual, in the absence of careful examination, to be deceived by this deafness and to believe there is more complete mental obnubilation than is the case.

Very often, when making researches as to voltaic vertigo, it is found that resistance to the galvanic current applied to the temples and mastoids is much increased; not infrequently the patient will be able to bear currents of 15, 20, and 25 milliampères almost imperceptibly, whereas in the normal condition vertigo is produced and the head markedly bent with about 4 to 5 milliampères. This fact would have an important diagnostic value, if we

¹ The observations of authors are somewhat discordant with regard to arterial tension and the pulse of commotional patients. The difference is doubtless due to the variations in the frame of commotional patients, the observers believe, and also to the later or earlier period of the investigation. Jean Lépine (122) has recorded considerable hypertension, Biscons and Mercier (25) have seen moderate acceleration of the pulse, marked elevation of minimal pressure and differential hypertension. Logre and Bouttier (150) have noted instability of the pulse and arterial tension, with the syndromes sometimes divided.

were able to state that emotion alone, by the vaso-motor disturbances and changes of pressure it causes, was incapable of considerably increasing the resistance to voltaic vertigo. Unfortunately, our researches are by no means convincing with regard to this.

If lumbar puncture is performed on these patients, hypertension of the cerebro-spinal fluid is generally found, the fluid spouting out; the increased resistance to voltaic vertigo is probably due to this hypertension. This cerebro-spinal hypertension has already been noticed by some authors, Ravaut (198), Leriche (143), Baumel (19), Dupouy (66), Claude (43); it was observed in a general way, without much notice being taken, from our viewpoint, of what in the disturbance was true commotion, confusion, or emotion. We can confirm its reality with regard to true commotional patients, on whom lumbar puncture was performed a few days after the commotion; these, however, are only impressions, for we have not used a manometre and can give no figures.

This increase of the cerebro-spinal pressure, like that of voltaic resistance, might be of diagnostic importance if we were thoroughly convinced that emotion alone is incapable of inducing this hypertension; but, if one believes in the interesting researches of Georges Dumas and Laignel-Lavastine (61), emotion, which causes such great vaso-motor disturbances, both transudatory and secretory (pallor, perspiration, diarrhoea, etc.), is capable also of inducing variation of considerable proportions in the pressure of the cerebro-spinal fluid.

Slight cerebro-spinal hyperalbuminosis, and even lymphocytosis, are sometimes reported; but we

have proved neither the one nor the other, as a general rule. Further, in the absence of possible contusion or focal lesion, we have never observed hæmatic or xanthochromatic coloration of the cerebro-spinal fluid. The most we have sometimes found has been some more or less shrivelled up hæmatin in the apparently clear fluid, with or without some lymphocytes, which appeared to have no relation to the puncture.

These statements do not seem to have the great interest sometimes attributed to them. There is nothing surprising in the fact that, under the influence of a simple intense emotion, which causes an abrupt peripheral vaso-motor constriction and not less abrupt deep congestion, the suddenly hypertense cerebro-spinal fluid should carry with it a little more albumin, a few more lymphocytes or red globules than normal. Fresh research on this subject is necessary; for the moment, we refuse to consider the few modifications observed in the cerebro-spinal fluid as characteristic of true commotions.¹

¹ Guillain, Roussy, and Boisseau (211) have noticed nothing abnormal after simple commotions; neither, for the most part, have Dupouy (67) and Claude (13). The latter, however, has found hyperalbuminosis ten times and lymphocytosis six times; Souques (222) twice found albuminosis and lymphocytosis; Mairé and Piéron (155) hyperalbuminosis fifteen times; Dupouy has once seen numerous hæmatin; G. Dumas and Aimé (59) once out of twelve times found a little blood.

These statements could only be of value if they were unanimous, and if, in default of precise analysis of the conditions of the accident, almost all the authors had not confused commotions, contusions, and emotions. Some of them thought they were making an adequate division by eliminating hysteria, as if all the pathology of emotion were embodied in hysteria.

As the commotional patient gradually comes out of his inertia his sensations can be noted, and two symptoms are rarely absent : headache and vertigo.

The headaches are diffuse, sometimes encircling the head, sometimes at the crown, and very frequently they are more or less exclusively frontal, but never exclusively occipital ; in the absence of any possible contusion or focal cerebral lesion, they are hardly ever localized ; exceptionally, however, they are more or less hemi-lateral, corresponding with the side on which the skull fell. They are continuous, dull, more or less paroxysmic, with a sensation of tightening as of a vice, of lead in the head. They are aggravated by movement, noise, a bright light, any effort of memory or attention, and often by a certain position, as for example if the head is bent forward. They persist day and night, and sometimes, despite apparent somnolence, contribute largely to persistent insomnia.

The vertigo is marked mainly by abrupt sensations of the patient having lost his bearings, of general nonentity, and obnubilation of sight and hearing. He has no sensation of objects turning round before his eyes, nor of giddiness in himself, no preliminary buzzing, nor hypo- or hyperacoustics, beyond shock of the temporo-occipital region or increased labyrinthal commotion. The vertigo occurs especially when the patient is standing or walking, but may appear when he is sitting or even lying down ; sometimes it occurs preferably when his head is bent forward or backward. He nearly always prevents himself from falling by leaning against a wall or piece of furniture ; and rarely tumbles down.

These symptoms have previously been described as occurring in civilian life, often in railway accidents, for example. They are analogous to those produced as the after-effects of most cranial traumatisms, and Professor Pierre Marie (168) has recently justly called attention to the importance of these subjective troubles, which might be easily simulated after surgical or accidental trepanning. Nevertheless, as we have already indicated (127), in localized traumatisms, there are generally some signs of localization which occasionally have almost the value of genuine objective symptoms.¹

The patient's intellectual condition can also be studied better as he gradually comes out of his inertia. Intellectual activity is found to be retarded in a diffuse manner: reasoning power, volition, and affectivity are blurred, but they are not extinguished; the soldier's first smile is generally for his wife or mother, who has come to his bedside, often also for

¹ Thus, patients with head wounds appear to us to suffer from headache and persistent and grave pseudo-vertigo much more frequently, when the wound is situated in the frontal or occipital region, and from comitial, Jacksonian, or generalized attacks, when it is situated in the parietal region. The headaches are almost solely frontal when the wound is situated in the front; they are hardly ever exclusively occipital when the wound is occipital; they are, therefore, either encircling, at the crown or only frontal. When the lesion is in the occipital region, and sometimes in the temporal, the vertigo is accompanied by visual disturbances: turning sensations, obscuring of vision, objects with blurred outlines, juggling, and reappearance of the objects as by the effect of a camera obscura, etc. Vertigo from frontal lesions consists in simple and rapid obnubilation of consciousness, with a sensation of losing oneself altogether, of nonentity, etc. The symptoms of commotional disturbances most resemble those consequent on frontal wounds.

the doctor or comrade, who speaks to him of his native village.

Neither is the entire memory profoundly affected. We have stated that the patient recalls elementary factors concerning himself, his name, age, country, regiment, etc.; further, he often knows his address in town or the department of his village. Not infrequently, while apparently inert, he will reply quite correctly to some question of mental addition or multiplication, repeated more than once, but in a tired, dull, weary tone, as if he did it to get rid of the person bothering him. It is not exceptional for him to know the day and even the date, and to reply mechanically to a question, while the observer is again endeavouring to obtain a response.

True, the responses are not always easily obtained, for these patients are depressed, inhibited, obtuse; indeed, they often strangely resemble confused idiots; but there is neither confusion, distraction, mental inco-ordination, nor global or irregularly dissociated amnesia. Serious examination disposes of the idea of such an assimilation, and, from what we have seen, we can say that true commotional patients are not, as a general rule, true confusional patients, in the psychiatric sense of the word.¹

One recollection, however, fails absolutely in commotional patients, that is, the memory of the accident

¹ The term mental confusion, in the vulgar sense, has often, it is true, been used in such an exaggerated, vague way, that it has become synonymous to certain authors with mental or ill-balanced asthesia. In these conditions, stupid or vague varieties may be easily attributed to either the one or the other, indeed to almost all mental disturbances, which, like general paralysis do not show proof of their organic origin by objective signs!

itself and of a longer or shorter period following it. Very often when the shell, which explodes close to them, has, as it were, been an isolated one, they have heard it coming; sometimes, but more rarely, they have seen the explosion; but from that identical moment their memory of it has entirely gone. At other times, they have not heard the shell coming; this is often because they have been in the midst of an avalanche of projectiles, in barrage, fire, for example, where it is impossible to make any distinction. Sometimes, although the sector was quiet, they heard nothing and do not know whether a shell came, but they remember very well that they were at a certain place, in the front trench or at the door of a dug-out, were doing some particular thing, watching through a crack, fixing a gun, or writing a report, for example.

Whatever it was, whether they heard or, more rarely, saw the shell or not, they do not know why they were thrown down, hurled into the air, or covered with earth, how long it was before they were picked up, or by whom, whether it was night or day at that time, nor by what means, or from what clearing station they were evacuated. Sometimes they come to themselves at the clearing station, sometimes only on admission to the field hospital during the excitement of arriving and being put to bed; sometimes again it will be several days later. With regard to what has happened meanwhile the mind is completely blank; there is a lacuna in their memory.

Is this lacunar amnesia? From this point of view, a distinction must be made between two periods.

First of all there is the period of complete loss of consciousness, during which the patient is quite absent from the outside world, seeing and hearing nothing and evidently remembering nothing. He is in the condition of a patient under chloroform during the period of complete resolution. People who after narcosis have analysed the condition at all, know what a lacuna, what a hole in the existence, was experienced on awaking, an absolute lacuna, very different from the incomplete one of natural sleep. During this period one must not speak of lacunar amnesia, for the commotional, any more than for the narcotized patient.

But directly the patient comes to himself, although only incompletely, he sees and hears; if he retains no memory of this second period, there is lacunar amnesia.

In practice, it is often very difficult to distinguish between these two periods; a similar separation is retrospectively impossible, without knowledge of the precise conditions occurring, of which the patient must have been aware, but of which he has retained no memory. But this is precisely what happens sometimes with commotional patients. For example, X. is admitted to a field hospital, he replies to some questions, gives indications as to his name, his military situation, the place he comes from, goes upstairs and put himself to bed in the one assigned to him; the next day and the following ones he remembers nothing. Further, the next and subsequent days he replies very logically, and distinctly to conversation, but has absolutely no memory, either of the previous day's conversation or of what he has been doing up to the moment of

being spoken to ; there is evidently lacunar amnesia and even amnesia of fixation.

Delimitation is not easy either between these two last varieties of amnesia, for there is only a difference of duration between them, and duration of neither variety is, or need be, delimited.

With regard to true commotional patients, it may be said, from our observations, that if the lacunar pseudo-amnesia of the comatose period is constant, and very frequently of the sub-comatose and profound obnubilation periods (in which the patient registers very little and stores nothing or hardly anything), true lacunar amnesia and continuous fixation amnesia are rare. We have seen undoubted cases, but far less frequently than is currently reported ; lasting amnesia is *en rapport* with more or less persistent inertia and relative cerebral inhibition.

In every case, as we have already said, amnesia begins with the traumatism itself ; it is more or less antegrade, but is only rarely retrograde. It is only exceptionally that it touches notions acquired before the accident. At most, unless in exceptional cases, it only affects the moments which immediately preceded the explosion. Further, it is as well to make certain distinctions.

Indeed, as we have said, the commotional patient is essentially an obnubilated one ; it is not very surprising that for a time he should lose more or less the abstract notions he acquired previously. The retention of similar notions is merely automatic for anyone who has not been professionally trained (philosopher, mathematician, professor, etc.) ; it always necessitates a certain effort, not only of pure

memory, often of reasoning power. There is no need to be commotional; in ordinary life it is sufficient to be simply tired, to recognize the effort necessary to recall more or less abstract memories. Now commotional, obnubilated, and inert persons are incapable of making this effort. The patient will often appear to be amnesic, or not, according to the manner in which the interrogation is conducted; it will be necessary to push him, if one may say so, to make him gradually assimilate the business; general questions must first be put to him, then more and more precise ones, stopping when he becomes too fatigued. It will often be surprising what a number of unsuspected memories the commotional patient has retained.

Another category of memories of the past life disappears with particular frequency, that is the recollection of dates, proper names, and places; commotional patients are supposed specially to have forgotten the localities in which they were camped, the periods they spent there, the names of their officers, or even of their comrades. For this to cause surprise, one must not have seen troops in the field at close quarters under the conditions of the present war. It is impossible to imagine the intellectual, emotional, and even affective indifference acquired by an immense mass of soldiers during many months of primitive, almost bestial and troglodytic life, exposed at every moment to the worst dangers! At the foot of Dead Man (Mort-Homme), the day before the decisive attack, during the heavy artillery preparation, amidst a deluge of shells, we came across numberless soldiers quietly going on with their occupations of nocturnal revictualling,

as if they were doing their ordinary work in the fields, but did not find a single soldier who was able to tell us where he was ! How is it to be expected that, later on, if these soldiers had come to the rear, owing to commotion or wounds, they should be able to remember their encampments, or the dates on which they occupied them ? They had become accustomed to a mode of life that was almost entirely automatic and, like the others, they executed their duties as good workers, no matter how dangerous they were. Extraordinary as this may appear, if they do not remember the names of their chiefs it is probably very often because they have never known them, if not that they never paid any attention to them : to do so is an occupation of barrack-life and not of the battlefield ! As to the names of their comrades, they often do not know them either ; there are not many of them to whom they have become attached consciously or unconsciously ; they are too liable to lose them at any moment ; affection does not come in under the circumstances, the one who is helping probably remains anonymous.

If these remarks are taken into consideration and these soldiers are questioned, as soldiers at the front must be examined, it will be observed that true commotional patients have hardly ever lost the real memory of facts even which immediately preceded the accident. We have said that, granting extreme intellectual and physical fatigue, only the most precise questions must be put to them ; thus, it is not suitable to ask them to tell a complicated story because the linking up would probably leave much to be desired. It is necessary to lead them

on step by step, as if taking them by the hand, from their last clear recollection, their last rest camp, for example, right up to the place and the moment of the explosion. In order to arrive thus far, it is of the utmost importance that the doctor should himself know the places in question. It is not at the rear, after some considerable time has elapsed, that such work should be undertaken; it is tedious work, perhaps as painful for the doctor as the patient, but infinitely productive.

It is worthy of note that memories thus called up and co-ordinated with the collaboration of the doctor, will afterwards be retained by the patient. The same memories, left to themselves in the more or less permanent inertia of the commotional patient, will become progressively blurred, and eventually effaced, like all insufficiently vivid and repeated memories. When, later on, the patient arrives at the hospital, he will be considered to be suffering from retro-antegrade amnesia.

We regard retro-antegrade amnesia as very rare in commotional patients. We are in agreement here with Vigouroux and with Bonhomme and Nordmann (27), but should find ourselves diametrically opposed to the majority of authors, if we applied these statements to the total number of cerebral traumatisms. Such is not our intention; from our point of view, in contusional and emotional cases, the disturbances of memory are very different to the preceding ones and also from those of patients suffering from cranial wounds. Up to the present, we have only occupied ourselves with true commotional cases; but it is precisely in separating the different categories of cerebral

traumatism^s, with or without any wound, from the point of view of memory, that we differ totally from nearly all authors, even the most recent.¹ This is why we have insisted upon these memory disturbances in commotional patients.

Evolution takes place in three different ways :—

The commotional patient may come progressively out of his torpor and inertia ; movements become less painful, speech quicker and more frequent, and he walks with less hesitation. He gradually loses the appearance of dragging a fetter when walking, and of only instinctively replying to questions. He becomes less apathetic and distressed, and at the end of some days, or more generally weeks, regains almost normal activity and men-

¹ Before the war Déjerine (53) put in the same category all disturbances of memory due to "lesions of the cranium and of the encephalus, to fractures or hæmorrhage accompanied by concussion or compression, to traumatism^s which do not produce lesions, but cause commotional symptoms by rupture of the functional equilibrium. Finally, to traumatism^s which affect regions some distance from the cranium and bring in their train memory disturbances from emotional or moral shock." B. Oppenheim, in a recent and well-marked study on "traumatic amnesia of those wounded in the war" (188), retains this confusion of "the whole of the encephalic wounded, whether they suffered grave cerebral lesions, simple wounds or contusions of the scalp, had merely concussion of the nervous centres from commotion, due to the explosion of a shell, or simple emotional shock." Vigouroux, Bonhomme, and Nordmann (27) have, nevertheless, testified to the rarity of retrograde amnesia in commotional patients, but it seems to us they applied this statement to the whole of the amnesias of traumatic origin, faithful to the long-standing theory that traumatic amnesia is the same in all cases and cannot be subdivided.

talities. He only remains slightly fatigued with a definite hole in his memory as to the accident and a more or less prolonged period following it. Whatever medical men may think, who have only seen true commotional patients at the hospitals, this evolution towards complete recovery is most frequent.

Or the commotional patient may only improve, very gradually; for a long time, sometimes indefinitely, he remains depressed, physically and mentally, suffering from headache; he is an inferior being, at any rate markedly inferior to what he was previously.

Or again, after a period of progressive improvement, which seems almost equivalent to recovery, at the end of some weeks, or more rarely of some months, he will fall back slowly into relative torpor and inertia which, in this case more than in the preceding one, is sometimes infinitely prolonged, if it does not become permanent.

It is commotional cases of the two last categories that we shall find at the next halting place—at the inland hospital.

The following example illustrates a moderately commotional condition in a soldier.

Benoît, aged 35, farmer, admitted to the field hospital on 27th August, in a condition of intense stupor, unable to speak, or give any information beyond the word “shell” repeated several times, but in its correct sense, when questions are put to him. Sensation of physical annihilation, overpowering desire to sleep, despite the pain, which seems fairly intense at the seat of the various contusions (left knee, right foot, lumbar region).

Tendon, patellar, and other reflexes equal, but very quick; the cutaneous, cremasteric, and abdominal reflexes are also too strong; plantar reflexes flexed.

Mydriasis of pupils; they are equal, and react normally to light and accommodation. Tendency to photophobia, although there is neither keratitis nor conjunctivitis.

Audition diminished, especially on the left; watch heard at a distance of 15 centimetres on the right, but at 3 centimetres only on the left.

Pulse regular but slow, being 54, and a little weak. On auscultation nothing found in heart or lungs.

This examination alone enabled the diagnosis of true cerebral commotion to be made.

It was several days before the soldier was able to state that on the evening of the 25th or 26th August, he was behind a parapet in the trench and, as watchman, was looking over. A shell came, but he did not hear it coming, and did not know if it was a large one. It burst on the parapet, smashed it, threw him down and covered him with earth. From that moment he knew absolutely nothing of what had happened. He came to himself on the 27th; in a hospital (probably the selection centre); up to then, that is from the 25th, or 26th, to the 27th, he knew nothing of what had happened to him; but after that he was cognizant of time and space; for example, he knew that from the hospital, where he came to himself on the 27th, to our field hospital (Centre of Neurology), where he was transported the same day, he came by motor and without changing carriages.

Six weeks later the patient left hospital quite well,

but still having diminished hearing on the left side and a pulse of 48. He rejoined his Company after a few days of convalescence without going to any inland centre.

The preceding description is an example of the common variety of commotional patients to be found in a field hospital. Sometimes the inertia goes even further and the patient, on coming out of the comatose state, presents more accentuated physical and mental inertia, in the form of genuine narcolepsy. He will sleep for several days, quite calmly, without eating or passing urine; fatigue overwhelms him; the necessity for sleep dominates everything else. When shaken a little quickly, he replies to questions logically, but without opening his eyes; when he really awakes, he has no recollection whatever of having been questioned.

Here is an example of this narcoleptic form:—

Charlot, officer, aged 33 years, admitted to the Neurological Centre at 3 a.m. on the 26th July. He arrived asleep on a stretcher. Shaken and questioned to find out if he could get up and walk upstairs, he showed that he could by mutterings rather than by words. Supported by two nurses, or rather carried under the arms, he walked upstairs, practically asleep, nodding his head. He was undressed and put to bed.

He slept the whole of the next day; when shaken violently, he only gave a few grunts; his orderly, who had come to see him, was no more successful in awakening him than the doctor. Nevertheless, when his position was changed, or he moved himself, he made a painful grimace; the pain seemed to be

situated in his back ; despite this there was no sign of any contusion. He passed no urine during the entire day ; about 9 p.m., after he had been shaken violently, he was made to stand up and pass urine ; he himself held the urinal, but kept his eyes closed ; he passed a quantity, more than a litre. Put back to bed, he at once fell asleep again.

It was only two days subsequently that he awoke and was able to speak, and even began to laugh when told of his prolonged sleep. He complained of pain in his back. He related his story as follows :—

On 25th July, at 9 o'clock at night, that is to say, exactly six hours before being admitted to the field hospital, he was near the village of E——, at a part of the road he remembered perfectly, when he was caught by barrage fire ; he saw and heard a shell burst at his side ; from that moment he remembered absolutely nothing. His orderly fully confirmed his account ; he added that when Charlot fell, while he was running to help him, a second shell burst quite close to him. He was lifted up inert and carried off at once, first to the clearing station and then to our field hospital.

The patient had absolutely no recollection, either of the transport, arrival, or of the following day's journey. Although he had been asleep during the whole of this time, but in no way comatose, he walked alone and understood the questions put to him, replying to them, if not very clearly. Further, he stated that at the time of the occurrence, he was not particularly tired ; he had been asleep during that day, the preceding nights having been somewhat lively. There is no doubt the starting point of the narcolepsy had been purely commotional.

The urine contained neither sugar nor albumin. There was no disturbance of objective sensibility, motility, or reflectivity. He only complained of pain at the right side of the head and of being rather knocked up. Pulse 44.

His physical and mental conditions became progressively normal during the following days, the pulse rose and the patient was discharged from hospital completely recovered at the end of fifteen days.

This narcoleptic form is certainly exceptional. But we feel obliged to record this case, as we are certain a frequent mistake is made in regarding narcolepsy in cases of this kind as a hysterical phenomenon; in this particular case, it seemed clearly of a commotional order.¹

II. CONTUSIONAL PATIENTS

As we have stated, a patient with cerebral contusion may be first and mainly suffering from commotion; he only differs from all other commotional cases by the subsequent addition of physical or mental inertia and of some more or less clear signs of localization. The patient may arrive at the hospital before this period of the commotional state.

In other cases, this period is absent more or less completely, or at most, it is very transitory and, when the soldier arrives at the hospital, it has already given place to the signs which distinguish cerebral

¹ Vurpas and Porak have reported an instance of equivalent epileptic narcolepsy (233).

contusion, namely, diffuse cerebro-cortical excitation or deficiency, or localized irritation.

Mental and especially motor excitation then gives place to depression, or some plain sign of localization, such as localized convulsions, contracture, paresis, or dysphasia, will leave its special mark on the picture of cerebral traumatism.

It is chiefly as an effect of cerebral contusion that delirium is observed, with more or less violent agitation, often localized by visual and auditory hallucinations, dominated by pictures of war, assaults, explosions, enemy attacks, etc. As a rule the scenes are multiple and variable and, from this fact the contusional patient is often distinguishable from the emotional one, who, in his delirious excitement, always revisualizes the same scene, the more or less accurate or polymorphic reproduction of the circumstances producing the emotion. This is not surprising, when we consider that the emotional patient has been conscious of the occurrence throughout, whereas the contusional has nearly always lost consciousness entirely and been mentally absent.

The periods of agitation are often interrupted by periods of calm, even of depression, during which the loss of localization as to time and space may or may not persist, giving the clinical picture the appearance of hallucinatory mental confusion. Very frequently it is by interpolated periods of calm without loss of localization, that contusional cases are distinguished from authentic confusion.

It is specially in contusional cases, as with patients with cerebral wounds, that retro-antegrade amnesia is most freely observed; there is no memory of the facts which immediately preceded the accident,

as well as of a more or less prolonged period of former existence, and no memory of the accident itself.

Retrograde amnesia most frequently occurs with regard to the events which preceded the accident itself by a few minutes or a few days. It very seldom affects a very long period of existence, the whole duration of the war, for example, or professional or other ideas acquired before the war, the whole life of the patient from infancy, or even childhood. We ourselves have never seen such extreme amnesia in these cases, and later on shall discuss to what extent commotion or contusion appears to come into play in such extended amnesias.

Retrograde amnesia often retrogresses fairly rapidly; after some weeks or months, the totality of memories anterior to the accident has generally returned, and usually nearly all memories posterior to the loss of consciousness. This reappearance does not seem to be subordinated to the classical law of Ribot, namely, that memories of old facts will reappear before those of recent ones. Indeed, anterograde amnesia ceases almost at the same time as the retrograde amnesia, only the lacuna of the accident itself and of its immediate effects persists indefinitely; in the recovery of the one, as of the other, facts reappear in their appointed order. Very often there is almost simultaneously the renaissance of effaced images of most distant events and incidents immediately preceding the occurrence.

It is the possibility of a veritable re-education, however, that specially exercises considerable influence upon the return of memories: a comrade, who has passed through the same places and the same trials as the patient himself, may call to his

mind certain scattered memories of the so-called vanished period, memories which will bring up others in their turn and show that, as a matter of fact, this period was only blurred in the patient's mind. A cautious doctor, who is acquainted with the places and facts, may often play a beneficent part in such cases.

The proper names of persons and places, dates, abstract ideas, arithmetic, etc., as a rule are recalled more slowly than images of the facts themselves, namely, specially notable events of the war. These memories also are relatively susceptible to re-education. If they appear more freely and quickly in an officer than in a soldier, it is because, in a general way, they are more familiar to him. We have already said that very often, when making the inquiry, it is not ascertained whether the patient ever possessed the knowledge, even if apparently elementary, about which he is being asked, including proper names and dates; very often, being at a distance from the scene of the occurrence, it is impossible for the doctor to acquire this information. It is this fact which is often responsible for mistakes in observations of this nature, when taken some distance from the firing line.

From our point of view, it is a mistake to regard psychical war disturbances as the most intense, notably when in the form of amnesia in an officer. As a matter of fact, a much larger proportion of soldiers than of officers are evacuated owing to commotions, because it is under this name that commotions, contusions, and emotions are confused; emotions constitute the great majority. Now, far fewer officers are, quite naturally, evacuated than soldiers for simple emotions. For the same reason,

the relative number of serious cases is much greater amongst evacuated officers, most of them being true commotional or contusional cases, than amongst soldiers, the majority of which are simply emotional cases. This explains the apparent paradox, but which is testified to by various authors (Régis (199), etc.), that intense commotional disturbances are more frequent amongst officers: it is not merely a case of appearance.¹

As we have already stated, the signs of localization of cerebral contusion are convulsions, either Jack-

¹ We have stated that, in our estimation, contrary to the contention of classical authors, retrograde amnesia is infrequent and is only produced in contusional patients or those with real cerebral wounds: it would seem that a "memory centre" must be destroyed. Does such a centre exist in reality? It is not very probable, the majority of authors give no special localization to memory; certain of them, however, Froment and Boveri, have found intellectual and amnesic disturbances specially marked in left parietal lesions; we ourselves have thought amnesia was perhaps more pronounced in lesions of the fronto-parietal region. Whichever it is, a memory centre is clearly demonstrated; one cannot forget, however, that certain memory disturbances, at least, are well localized at the present day, for example, disturbances of verbal memory.

In any case, if in contusions or cerebral wounds this hypothetical centre is affected by retrograde amnesia, one must recognize that it would be certainly rather inhibited than destroyed, seeing that, in the immense majority of cases, the amount of memories previous to the accident which has been destroyed is relatively small, and only affects certain days, and also in the very great majority of cases, the memories reappear at the end of a fairly short period. True, verbal memory is reputed to be susceptible to re-education by the adaptation of the neighbouring centres (although this re-education seems proved in the cases where the aphasia centres, which are much more extensive than has been believed hitherto, would be really entirely destroyed); we have said that the general memory of contusional patients is also capable of a more rapid return, under the influence of a certain re-education; but, with or

sonian or not, partial contractures of the limbs, paresis (notably in the form of monoplegia or monoparesis), disturbances of speech, of writing, etc. These disturbances are often partial or incomplete; the headaches which accompany them are frequently more or less clearly localized. As a rule they disappear by improving, sometimes they become worse and take on the appearance of definite disturbances. We cannot describe them in detail here; that would mean going into the whole pathological study of the cerebral cortex.

The tendon reflexes are often strong, the pupils sometimes contracted, pulse rapid, once the period of commotion has passed, the temperature is frequently unstable and sometimes high, irrespective of any complication.

Finally, in our experience, hyperalbuminosis and cephalo-spinal lymphomytosis, even in the absence of any bloodstains, are specially observed in contusional patients, with or without wounds or apparent ecchymosis.

Even the immediate prognosis of cerebral contusion is quite different from that of commotion; it is always serious and frequently obscured by complications, especially by meningo-encephalitis or pulmonary infections, so frequent after all cerebral focal lesions. We have spoken of these with regard to contusional patients on the field of battle.

The following is a record of an observation of without re-education, this return is generally too rapid and too complete for one to believe in genuine destruction of a mnemonic centre and an adaptation of neighbouring centres.

Independently of any explanation, we have simply wished to report this clinical fact which has struck us, namely, the existence of authentic retrograde amnesia, especially amongst contusional patients or those with actual cerebral wounds.

slight cerebral contusion ; those reported in the previous chapter are characterized by their symptoms of excitement ; this is marked by some signs of localized deficiency, notably in the language zone, signs it is sometimes necessary to search for, but the value of which it is interesting to recognize.

Désiré, officer, aged 26 years. Admitted during the night of 27th to 28th August. He was brought in on a stretcher, and appeared inert. When asked in a rather loud voice if he could get up, he replied by a grunt which seemed vaguely in the affirmative. He was raised up and, supported under the arms, he mounted the stairs alone ; was undressed and put to bed. He seemed to be in an almost complete state of obnubilation.

The next day, however, he got up and in a flat, hardly comprehensible voice, asked the way to the lavatory ; a sign was made to him to remain in his room and use the commode ; he refused. Accompanied by an attendant, who guided him, he went to the lavatory like an automaton, but could not put the key into the lock.

The day after that, he was still in a condition of profound obnubilation and especially of physical and mental inertia ; he remained lying on his back, complaining of his head, and did not reply to questions by monosyllables, but seemed as if he were swallowing the greater part of the words, and only succeeded in producing a sort of incomprehensible splutter. He nevertheless partially succeeded in making himself understood by gestures, scraps of phrases or words.

He knew absolutely nothing of what had happened to him. He only remembered that he had left Verdun or the neighbourhood to go into the lines ;

he did not know whether he had been on the right bank or the left of the Meuse, nor at what date. He believed he had awakened that morning and had no doubt that the previous day he had been in the same condition, had spoken, descended to the yard, etc.; and the same fixation amnesia was produced for several days longer. Very clear and almost total retro-antegrade amnesia, of which the beginning could not be determined.

Further, he was only slightly bewildered; it is true he did not know where he was, and did not appear to worry about it; on the other hand, he knew that he was near Verdun and that it was the 28th August (in reality it was the 29th).

Nothing abnormal in motility, sensibility, and reflectivity.

Pulse, 68 in the morning, with a temperature of 37.6° , rising at night to 92, with a temperature of 38.5° .

Without apparent hypertention, lumbar puncture yielded a very clear non-hyperalbuminous fluid; the deposit contained fairly numerous red globules, badly coloured and deformed, which, despite the absence of hæmatic or xanthochromatic coloration of the fluid, might perhaps be due to slight anterior concussion.

As, besides amnesias, the patient was suffering from slight ulceration of the tongue (of which he did not complain, however,) and marks of burns of the left fore-arm in the form of phlyctæna or ulcerations, one wondered whether, despite his hospital card which was inscribed commotion, it might not be a case of simple epilepsy.

A soldier, who was with him at the time of the occurrence, and was admitted to our Centre a few hours after him, settled the matter for us. On the

evening of 27th August they were both of them, together with several officers, in a German shelter, which had been recently captured, which was down ten steps and consequently could not be broken into except by a large calibre shell. A shell burst at the very door of the dug-out, which was turned towards the enemy lines ; all the officers inside were killed, with the exception of these two ; they were both of them at the far end, were thrown out violently, and the shelter fell on them. This soldier presented fixation amnesia similar to that of the officer, but less prolonged.

As to the officer's retrograde amnesia, thanks to this soldier, we were also able to fix the date on which it began : the officer's last recollection was his preceding relief ; this had taken place on 5th August, that is to say, twenty-two days before the accident ; the period of rest, going back into the lines again, and a series of successive advances had left absolutely no memory in the mind of the wounded officer.

In the following weeks, the spluttering speech, noted from the beginning, became more pronounced, and it was possible to verify the fact that, if the words were badly pronounced, it was perhaps because their image was badly presented to his mind, which is the result in every case of pronounced disturbance of articulation.

His writing became no clearer, far from it ; it was almost a month after the accident before the patient was able to write to his mother ; this letter was almost illegible, the words were running into each other, the letters and words were partly above the line, partly double, the sentences were strewn with erasures and bad faults in orthography, the writing itself being

that of a child. Things copied or written from dictation were no better. The patient was a notary's clerk, obviously trained, and, when he came completely out of his torpor, it was evident that it was a case of agraphic disturbance.

His ideas of arithmetic, moreover, were markedly blunted, he could not do a sum of simple multiplication, nor, naturally, of division. In fact, there was a small anarthric syndrome present, which had to be looked for, but was then manifest, and resembled point for point the other anarthric syndromes in patients wounded in the war, recently described by Pierre Marie and Foix (170). An indication of localization could be obtained from these symptoms.

Some days after admission, the patient for half a day suffered from an attack of anxiety agitation, with fear of death and mental excitement, his cries of "I am lost," alternating with murmured fragments of prayers, which evidently were not customary to him.

Frequent and intense headaches, one night necessitating the summoning of the doctor in charge.

His temperature fell to 37° two days after admission; the pulse fell to 44, and remained so for several weeks.

The inertia, amnesia and aphasia retrogressed very gradually. The soldier, wounded at the same time as he was, re-educated him in fact, and he recovered all his memories previous to the accident, and almost all of those following his arrival at the field hospital. Re-educated by the doctor in charge, he again learnt multiplication and division. When he left hospital, at his express request, at the end of two months and a half, he was still very easily fatigued, physically



For description, see page opposite

DESCRIPTION OF PLATE
FACIAL EXPRESSION—EMOTIONAL TYPE

The patient has just been awakened; he looks bewildered, his eyes wide open and haggard, the air of anxiety shown on his face contrasting with the inert and depressed appearance, atonic and half-closed eyes, and careless air of somnolence of commotional patients.

and mentally, and retained a slight tendency to splutter.¹

To summarize, this patient was probably suffering more from contusion than commotion; he had been buried in a deep dug-out and was at the bottom of the shelter; and, as we have said, explosions cause relatively few commotions if the victims are in well-sheltered places. Obnubilated and bewildered, with moderate loss of localization, exceptionally excited and anxious, he chiefly presented retro-antegrade amnesia and a small aphasic syndrome (more accurately, anarthric). He recovered very slowly, by a sort of progressive re-education of memory, speech, writing, and arithmetic.

III. EMOTIONAL PATIENTS

The emotional patient, on arrival at the field hospital, is generally neither inert nor agitated; he is bewildered, dumbfounded, and, nearly always, fatigued.

Often, when first seen, he has the appearance of being more depressed than the true commotional patient. He is apparently asleep, and it is necessary to lead him to his bed and put him into it. If questioned, he does not reply. But one must not be deceived; this is only pseudo-inertia, only pseudo-obnubilation. If he is worried during sleep by being moved or by someone shouting in his ear, he moans, becomes agitated, then looks at his interrogator with a bewildered air, his eyes wide open, haggard, as if the prey of some intense anxiety and of a horrible vision.

¹ We have since learned that, after twenty days of convalescence, he had to go to a neuro-psychiatric centre, as he was still unfit for active service.

Moreover, no matter how somnolent he may appear, he sleeps but little or not at all, and, during the course of nocturnal insomnia, dreams, generally aloud. His nightmares are controlled by a vision, which is always the same, with a few variations, namely, of the accident which caused him to be evacuated (the bursting of a shell, gun, or mine, being buried under a trench, dug-out, etc.). For the rest, the condition is precisely the same, whether due to an explosion which has taken place at a certain distance, an attack or bombardment, or even a scene of carnage, without any explosion at all, of which the soldier has been a mere spectator without having suffered from commotion at all. Anxiety, dominated and directed by the emotional accident, always surpasses everything, in the physical aspect as in the mental condition, in the pre-occupations of the waking state or during sleep.

Further, with regard to the accident itself, no matter what question is put to the patients, the reply, when they will answer, is invariably: "I don't know." They know neither the day nor the place where the emotional shock occurred, nor what has happened since, and often what occurred previously; if believed, they have apparently lost their memory altogether.

Nearly all state that they are suffering from commotion, a shell fell, or there was an explosion. In fact, one memory survives, that of the accident itself. This recollection haunts their days and nights, and it is not difficult to grasp its nature from the many odds and ends of phrases used. If the conversation is turned on to this subject, the patient is often, as it were, abruptly unlocked, and the account he gives is animated and visualized

to a point which appears abnormal and belies his atonic and somnolent appearance of a few seconds previously.

Starting from this emotional accident, which is the sole clear thought and distinct preoccupation monopolizing the minds of these soldiers, it is generally possible to get them to indicate the exact time and place. The result is not always obtained at the onset; they do not always know the date, nor the proximity to such and such a town; but with patient insistence, it will be found that they know if it were bright or dull, nightfall or break of day, if they were in a first-line trench or a support trench, and what its name was (the trenches have often their names marked up like the streets of a town). After all, it is evident they are not astray as to time and space.

Question them still further, instead of being content with the ordinary reply that they became unconscious, ask them where they came to themselves; it is nearly always at the clearing station, sometimes only on arrival at the field hospital. But how did they get to the clearing station? They came because they had seen it when going into the lines, knew where it was and went there direct, or if they were beyond the trench, by first creeping as far as the trench. By skilled and progressive questioning, it becomes evident that, even if they have been thrown down and momentarily dumbfounded by the blow, they have hardly ever lost consciousness at any moment, and did not get themselves out of the affair without reasoning power. If only the doctor knows the places, is acquainted with the trenches to be traversed, the shelters they contain, the ravines to be passed, etc.,

if he has the patience, as it were, to take the soldier by the hand and lead him in thought to the place of explosion, to the clearing station and field hospital, he will nearly always find that the patient has perfectly retained the whole, or almost the whole, of his memories previous to the accident.

As regards former memories, which are much less defective, they are awakened in the same way, and generally more easily, by starting from the accident, which is, as it were, the centre of the patient's memory, and travelling backwards through the going into the line, the preliminary rest period, etc.

Thus, it is soon found that a patient, who apparently had retained no recollection prior to his accident and had sometimes lost all memory of a larger or smaller number of days before that, has really not lost it at all: this extremely amnesic patient has no amnesia at all! If we insist upon this fact, which is not classical in any way, it is because we have proved it many times, and because, from our point of view, it is destructive of an error frequently made, which it is impossible not to commit if the patients have only been seen at a later date, notably after their evacuation inland.

In the resuscitation of memories obtained by prolonged and well-directed questions, there can be no idea of re-education; it is certain the rediscovered memories were not lost memories; they existed, but were blurred. If the place they occupied had apparently been obliterated, it is because they were dominated by a very absorbing, monopolizing, vivid recollection, that of the memory of the accident itself, and of the emotional shock, which was the immediate consequence of it.

Concentrated in their emotion, possessing all the

moral disturbances of anxiety, and often all its physical signs, these patients no longer paid any attention to what took place around them: they were indifferent to everything except their emotion and its cause. It is because they had only a single thought that they saw without perceiving, heard without comprehending; they had visual and auditory sensations, but lacked the interpretation, which constitutes perception. After passing the active period of emotion, and when in relative security, this interpretation may be revived by renewing the visual or auditory memories. This is why it is found that a patient, who in quite good faith was apparently amnesic, is not, in fact, amnesic.

It has been justly said that attention is the mother of all the faculties; indeed, one can conceive neither memory, ideation, judgment, nor reasoning power without attention. Thus, in our opinion, it is essentially attention which is in default in the intensely emotional patient; the entire field of attention is occupied by the obsessing memory of the accident itself. Defective attention induces not only pseudo-amnesia, but also pseudo-depression, pseudo-obnubilation, and pseudo-loss of localization. A kind of re-education of attention is induced by detailed and careful interrogation of the patient; in this way memories are revived, which, if one may say so, remained in a sketchy condition, almost without the form of registered sensations, and certainly uninterpreted.

Recollections thus recalled, which have, as it were, been made conscious of themselves, remain in the memory and help to accelerate the return of the other faculties. But if an observer, being with-

out knowledge of facts and places, omits to give form to these superficially blurred memories by careful questioning, they will not be long before they disappear like the imperfect memories of dreams. If such a patient is questioned several weeks or months later, after being evacuated inland, if, moreover, vague, general, badly defined questions as to facts and places are put to him, not only will he reply in quite good faith that he remembers nothing, but in quite good faith also, he will be really incapable of remembering afresh.

To sum up, while in the case of commotional and contusional patients they have absolutely lost all recollection of the accident itself, and of a more or less prolonged subsequent period, and, much more rarely, of a previous period, in the case of the emotional patient, it is just the memory of the accident which dominates and monopolizes all the attention. As a result of this failure of attention with regard to everything which is not connected with the emotional shock itself, all recollections may be blurred of a period following the accident, and rarely of one preceding it, but they exist and can be recalled by appropriate interrogation; it is only later that these memories, already blurred, become more and more effaced.

The inertia, which marks the commotional patient, does not exist to the same degree in the emotional patient, in either the mental or physical domain. Mobility and sensibility are retained, the reflexes are generally normal, the pupils are contracted as often as they are dilated, and the pulse is unstable, being more frequently rapid than slow.

The subject looks fatigued; he is often pale, anorexial, has become rapidly emaciated, sleeping

by day and not by night. He has frequent nightmares, trembles, his head aches, he is afraid of noise, and weeps spasmodically at the memory of his emotion and perhaps of the danger through which he has passed. His speech is jerky, syllabic or stammering, and finally he often presents some one of the numerous hysterical manifestations so often described before and since the war, and to which we shall again refer later.

The following is an abridged account of the interrogation and observation of a bad emotional case :

Emilien, aged 20, accountant, admitted 21st October, under the diagnosis of cerebral commotion. There was no trace of any wound. He was depressed, hardly replied to questions, trembled, had to be held up by the attendants and put to bed. When in bed, he replied without scanning the sentences or omitting any words : " I am suffering from commotion owing to having been thrown down by a shell. I at once lost consciousness and I know no more." Nothing abnormal as regards mobility or the reflexes. Pupils rather large, reacting well. Pulse 54, then 80.

Continuous agitation during the night, with nightmares.

The following day, he related : " The day before yesterday, towards 10 o'clock at night, I was in a trench which had only just been dug, and protected by a little parapet only 75 centimetres high, when bombardment by large-calibre shells commenced. One of them, which I heard whistling, penetrated the ground 4 or 5 metres behind me, and burst. I saw a flame and was precipitated over the parapet. I lost consciousness and came to myself at 6 a.m.

at a Divisional Stretcher-Bearers' Station (S.B.S.), where I was seated, trembling and unable to speak." Pulse 90, without rise of temperature. There was a striking contrast between the apparent depression of the patient and his agitation when he related what occurred.

Interrogation.—“What happened to you after the explosion?”

• “I don't know, I became unconscious.”

“But how did you reach the S.B.S.?”

“I dragged myself in the mud as far as the trench.”

“Why?”

“So as not to be seen.”

“You did not lose consciousness immediately, then?”

“No, afterwards.”

“If you were sitting down at the S.B.S. and were not on a stretcher, you must have walked as far as there?”

“Yes, I had to walk.”

“Why were you at S.B.S. and not at the clearing station to which all the wounded are taken?”

“Because the clearing station was a long way from the zigzag trench where I was; I had seen the S.B.S. when going into the lines; it was much nearer.”

“Did you not meet an officer?”

“No.”

“Think again, in the zigzag trench.”

“Oh, yes. I was running and he was in front of me; I cried: ‘I am wounded!’”

“Then it was directly after the explosion; you had not lost consciousness, because you were running so quickly?”

“No, indeed, but it was just as if I had! I

remained on the ground, dumbfounded for a moment, seeing and hearing nothing more. Then I heard some explosions and dragged myself on my belly up to the trench, then to the zigzag trench, and then I ran ; I no longer knew what I was doing."

"How were you able to find your way again ? Were there any other soldiers with you ?"

"No, I was alone ; I knew the way because I had been there several times during the day. I met no one but an officer, but I paid no attention to anything, I was mad."

This interrogation shows how it was possible to gradually regain, little by little, the whole of the memory of a soldier who, in quite good faith, believed he had lost it, indeed, he believed that he had lost consciousness and had not lived this part of his existence.

Emotional troubles without complications most frequently are not grave, and the soldiers leave the field hospital at the end of a few days, with ten days' regimental leave, which is more a rest than a convalescence. In the case of a healthy and well-balanced soldier it follows, as is justly said by Devaux and Logre (56), that moral resistance overcomes all the emotions of war ; but morbid predispositions and emotional constitutions are far from being exceptional, and with more or less predisposed patients, violent emotion on the field of battle is liable to leave sequellæ.

As war emotions are extremely frequent, and infinitely more so than true commotions, it is not surprising that, although relatively rare, these emotional consequences and sequellæ are absolutely as numerous as they are varied ; we shall study them in the following chapters.

CHAPTER VI

COMMOTIONAL, CONTUSIONAL, AND EMOTIONAL PATIENTS

C. AT AN INLAND HOSPITAL

THEIR MENTAL AND PHYSICAL CONDITIONS (CONSEQUENCES AND SEQUELÆ)

ONLY a minority of commotional and emotional patients reach this third stage; a fact which has been too often lost sight of, and has been the cause of misunderstandings and confusion. Indeed, different medical men, those with the troops, at the halting places and at the inland zones, have referred to different categories of patients under the same denomination.

I. COMMOTIONAL PATIENTS

Prolonged cerebro-spinal commotion is relatively rarely seen at the inland hospital, for only a fairly small number of commotional cases are, or have to be, evacuated to the interior. It is still always characterized by inertia and inhibition, both mental and physical.

As an exception, the commotional patient sometimes remains torpid or semi-torpid; but the condition we are about to describe is reached by progressive, although particularly slow, improvement.

As a rule, the patient improves rapidly, but without returning to the normal condition, and it is several weeks after the accident, just when definite recovery is anticipated, that he progressively relapses, as it were : there has been a sort of period of meditation.

This prolonged commotion does not in any way differ from that long ago described as the result of railway, or industrial accidents (Erichsen, Vibert (229), J. Roux (214), etc.), but it must be cleared from all hysterical disturbances, which are merely added symptoms. This description has justly been accepted by Bonhomme and Nordmann (27)¹ as applying to war commotional patients.

¹ Mairet and Piéron (155, 157, 160), who apparently only made their investigations inland, certainly applied their description of the commotional syndrome to this delayed and prolonged form. This presumed syndrome, from our point of view, is so comprehensive that, indeed, it might include nearly everything. It comprises : " 1. Sensorial disturbances, particularly hypæsthesias and anæsthesias concerning all forms of sensibility—amblyopia, deafness, anosmia, agueusia, cutaneous and deep anæsthesias—and particular hyperæsthesias (painful neuropathic spots, vibratory osseous hyperæsthesia, etc.) ; 2. Motor disturbances, such as reflex hyperexcitability and convulsive attacks, or neurotic impotence ; 3. Vaso-motor and splanchnic disturbances (especially including headaches), vertigo ; 4. Affective disturbances (predominance of egotistic sentiments under the form of fear or anger, with diminution of altruistic sentiments) ; 5. Association disturbances, comprising evocation amnesias and apraxia, of which mutism is the most common example, intellectual inertia, automatic imaginative hyperexcitability (nightmares, hallucinations) ; 6. Finally, functional disturbances of apprehension (fixation amnesias, inability to fix the attention)."

This syndrome thus contains almost the entire nervous and mental pathology ; it includes, amongst others, mental inertia, upon which the authors justly insist, but also obviously comprises hysterical symptoms and emotional disturbances. Further, as

From a mental point of view, the commotional patient is inhibited; this manifesting itself in all the intellectual faculties. He replies slowly to all questions, on the one hand, because he only understands them with difficulty, on the other, because the ideation necessary for his reply is diminished. He carries on his conversation in monosyllables or in chopped-up phrases and stops directly the questioner ceases to talk to him: the conversation has practically to be kept up by force, and seems painful to the patient; directly it is somewhat prolonged it becomes impossible.

Writing is still more painful than speaking, for it

Mairet and Piéron remark, it is not surprising that Sollier and Chartier (221), Chavigny (40), Dupouy (66), Guillaïn (85), Souques (222), Roussy and Boisseau (211), should have rediscovered the elements of this syndrome; several have insisted upon physical and mental asthenia; but in the majority of the descriptions, made moreover at different periods, the accurate analysis of the symptom itself, which is indispensable, is lacking.

It is conceivable that Mairet and Piéron's (158) emotional syndrome is only distinguished from the preceding one by a few more or less subtle differences; it is necessary to add a mental syndrome which, on examining the facts, certainly does not form an integral and obligatory part of post-emotional disturbances, namely, a dreamy mental confusion.

It is not surprising either that, in this commotional syndrome Ballet and Rogues de Fursac (17) should have found as many emotional as commotional elements; apparently, they have denied the independent commotion of emotion, whereas, as a matter of fact, it does not seem to us that the dissociation can be denied, except by expurgating the clinical pictures of all their parasitic attributes and only considering clinical pictures which are clear etiologically and symptomatically pure.

Certain types of commotional syndromes described by Mairet and Piéron (203) almost serve us as observation types of emotional patients with confusional disturbances, if our statements are

requires a more sustained effort, almost as much physical as mental. If the patient is told to write down what he has to complain of, he will hesitate a long time before picking up the pen, then, with it in his hand, he will again hesitate, write a few words or, as often as not, put it down again without having written anything. c *

All these movements are executed slowly, with a weary air, half-stupefied, mechanically, as if intelligence and volition had no part in the transaction.

It is very difficult to fix the attention, and every effort to do so induces rapid and altogether excessive fatigue. This difficulty of attention plays no mean part in the slowness and almost impossibility of verbal or written conversation. It is the main factor also in memory disturbances; it is because of inattention that commotional patients perceive so few facts taking place around them, and in consequence

recalled, from observation on the spot, of the immediate and consecutive conditions of emotional patients, and what we shall say of the frequent association of this condition with hysterical phenomena and mental confusion. Thus, is the observation of the soldier, Ab——, who was in the middle of a group of men; a 105 shell passed through a wall and exploded in the midst of them, the only ones that escaped being a lieutenant and the soldier Ab——; on coming to himself, the lieutenant saw Ab—— standing up, with a bewildered air, looking at the dead bodies; called by name, he started, and rushed away weeping and crying out; it was necessary to catch him and shut him up in a cellar. . . . The next day he did nothing but cry the whole time. . . . 'When sent away to convalesce, he had an attack of fright in the street and was taken up by the police. . . . He walked slowly, with eyes unusually widely open, with a terrified look on his face. He had buzzing of the ears, vertigo, etc., some deafness, slight retraction of the field of vision, hypoesthesia with hypoalgesia on the left and hyperalgesia on the right, etc. Nightmares, awoke with a start. . . .'

can, *a priori*, only retain very few recollections. Lack of attention again is why they register such a small number of the facts which, all the same, they see and hear, and acquire hardly a single fresh abstract notion.

But memory itself is hardly, if ever, in default; what has been not only seen but perceived, is preserved and may be awakened by fairly detailed and careful questioning. Memories emerge thus and are spread over the whole existence posterior to the traumatism, with the exception of the recollection of the commotion itself and of all the following period of coma or sub-coma. The so-called fixation amnesia appears only very incompletely if, by knowledge of incidents in his former life, one knows how to question the patient and takes the trouble to do so. Retrograde amnesia, amnesia of recollections prior to the traumatism (putting aside amnesia of the few moments which preceded it), is very exceptional, from our point of view, as a result of simple commotions, without either cerebral contusion or external wound.¹

* Mairé and Piéron (156) have found abundant cases of major amnesia, either of fixation or of evocation, "examples of which have been collected up to the present time as a rare curiosity." With Vigouroux, Bonhomme, and Nordmann (27), on the contrary, we consider true retrograde amnesias very rare, and not a habitual part of the syndrome of true commotion. Further, we regard true fixation amnesia, independent of attention, as fairly rare and especially as somewhat limited after true commotions.

Perhaps the disagreement between these conceptions is more apparent than real, for Mairé and Piéron state justly that restoration of memory "depends upon localizing the examinations of the commotional patient, and upon the points of contact upon which one can lean. When the mind works from the points of contact supplied to it, one recollection brings back another, and the

The commotional patient has not lost his bearings as to time and space. He acknowledges his inertia, and impossibility to think or, still more, to act; although his affectivity is also much diminished, he suffers in a more or less conscious manner; he often has the idea that his condition is incurable and that it will be impossible henceforth for him to resume active life or take up productive work. He is depressed, sometimes melancholic and isolates himself willingly.

Impressionable to excess, weeping easily, and often in an irascible mood, he becomes irritated almost without cause, if he only has to renew an effort, or express a desire twice, but he is at once sorry for his very brief sudden anger, it is a straw fire which is always rapidly extinguished.

From the physical point of view, the commotional patient is an asthenic; as he is always tired, he reduces his movements to a minimum. Further, he suffers from continuous and dull headache; this gives him the impression that he has lead in his head or that his head is going to burst, and this diffuse headache seems to have much to do with his physical and mental inertia. Every movement exaggerates the pain, as for example bending down, looking at the ground or sky, and any special effort. The headache is accentuated by noise, or a strong light, which accounts for the patient isolating him-

lacuna finally nearly disappears; . . . with inertia of commotional origin it is impossible to evoke memories, which it might be considered would be well preserved." • Still the observations of these authors with regard to commotional patients appear to us to contain many details which reveal mental confusion, emotion, or hysteria.

self; by all sustained manual or intellectual effort, with the result that he will remain for hours inert and unoccupied, often as if absent mentally. While sometimes aggravated at night, it only partially disappears in the morning. Almost spontaneously continuous, nearly always, at any rate mainly, frontal, the headache is aroused by the percussion of every cranial point; every jerk is painful, even if indirect, and a journey by carriage, tram, or railway is often torture.

Further, the 'commotional' patient has nearly always attacks of vertigo, coinciding mostly with the sudden exacerbation of the headache, more often with a movement, such as bending the head, or with an effort. Vision is suddenly disturbed or obscured, the patient feels as if his head were empty, that his legs are made of cotton wool, that the sun no longer shines, his whole being is slipping away; he has a sensation of nothingness. It is all a matter of a second and, as a rule, the patient does not fall; if near a wall, he will lean against it; otherwise, frightened by this horribly painful and distressing sensation, he will lean for support or rest as soon as possible, but the painful sensations have already disappeared.¹

Sleep is always painful, disturbed, interrupted by nightmares, hypnogenic hallucinations, and long

¹ These disturbances are assuredly of a simple order in all cerebral traumatisms and are not found specially in commotional patients; they have been described particularly by Professor Pierre Marie as existing in a third of the cases with cranial wounds, whether the patients are operated on or not. According to the traumatic regions, their varieties differ and cause them to be regarded sometimes almost as symptoms of localization; we have already spoken of them in the preceding chapter.

periods of insomnia. The nightmares and hallucinations are terrifying, of a warlike nature, revealing the different aspects of the professional life of the modern soldier: attacks, explosions, scenes of carnage, enemy pursuits, etc. In the morning the patient awakes more tired than when he went to sleep. A fact to be noted is that apparently the return of cerebral activity is first mainly nocturnal; this fact is not exceptional in this pathology and is observed, for example, in the course of febrile affections.

The tendon reflexes are generally strong, sometimes very strong, but as a rule there is not any epileptoid trepidation, unless it is the false trepidation of neuropaths in certain cases. Otherwise the reflexes are equal and, apart from signs of cerebral or medullary contusion, we have never found the inequality asserted by some authors. Neither have we, in the same conditions, ever come across Babinski's sign. There is sometimes a certain tendency to contracture, an indication of Kernig's sign, and of stiffness of the neck. The appearance and attitude of certain patients of being more or less welded together "as if they were afraid that they might break," is accounted for by this stiff neck, by slight but generalized contracture, headache, and vertigo, by the disseminated pains which any movement may induce, and sometimes even by the patient's inertia.¹

The pupils are moderately dilated, fairly often large, and react feebly to light. The pulse often

¹ Even at this late period, Vigouroux, Bonhomme, and Nordmann (27), Mairet and Piéron (157) are said to have found hypertension and hyperalbuminosis of the cerebro-spinal fluid.

remains slow during several months, and arterial tension is low.¹

The headaches and vertigo from which these patients suffer certainly contribute a share towards the growth of their mental inertia and the irritability of their character.

Once established, the commotional condition generally lasts a long time, the duration of the prolonged cerebro-spinal commotion being measured by months and still more frequently by years. With the alternations of aggravations and improvement, these chronic commotional cases, which, we repeat, are far from representing the majority of true commotional patients, remain infirm for years, they are much inferior in every way to what they were previously, they are incapable of making their mark in the world and more frequently of again taking up their old trade and earning their living.

Then progressively cerebral activity is reborn throughout all the domains at once, and these patients slowly emerge from their torpor. It is, therefore, sometimes surprising to find that, if during this long period they have acquired nothing, on the other hand, they have lost but little, for they have practically retained their memory. On the whole, they appear to have emerged from a long dream, and while there is neither sensible mental nor physical deterioration, they have, as it were, been hibernating. Cases that have been plunged into

¹ MacAuliffe (153) has very justly noted that in trepanned cases, a genuine commotional condition often exists for months, during which the pulse particularly remains for a long time slow and unstable, then becomes rapid (often still remaining unstable) before again returning to the normal.

dementia are exceptional, and one cannot but ask whether here the commotion has been anything more, in the development of this dementia, than the means of releasing it in a predisposed subject.

II. CONTUSIONAL PATIENTS

As we have already stated, cerebral contusional cases are often simultaneously commotional; further, sometimes at a later date, they present a picture of prolonged cerebro-spinal commotion, identical with that we have just described.

This picture, however, is generally somewhat blurred, for the degree of the contusion, the localized shock, is not *en rapport* with that of the commotion, a sort of diffuse shock. On the other hand, there is frequently either the continuation of one of the symptoms of localization, reported in the previous chapter, hemi- or mono-paresis, dysphasia, Jacksonian convulsions, etc., or the appearance, not of inertia properly so-called, but of a genuine deviation of character or of intelligence. An individual who was formerly calm, becomes agitated, a quiet one irascible, or a weak one violent, an atheist becomes mystical, or a rigorist unscrupulous, etc. These differences from the anterior condition are often such that it seems evident they must be due to the accident, and the question of responsibility is at any rate partly solved.

Finally, it is not rare for the evolution of these disturbances of depression or of excitement to follow a progress of jerks, which is jerkier, as it were, than with commotional patients. This evolution is not

without some relation to what is observed specially in hæmatomæ of the dura mater ; but the relationship is worth noting

An observation, recorded by Robert Oppenheim (188), seems a good example of the prolonged contusional condition without sign of localization. " In the case in question a distinguished engineer, in 1911, had a bad flying accident. Picked up covered with contusions, with fractures of the ribs, clavicle, and ilium. At the end of forty-eight hours he came out of a period of coma, which again was followed by a confusional phase of some days, and presented a typical retro-antegrade lacunar amnesia, with absolute loss of memory of the day preceding the accident. For a long time it was possible to allow him to ignore the grave traumatism he had suffered and make him believe he had an accidental fall in his room. Recovery took place without incident, the lacunar amnesia being apparently the sole result of the traumatism. But three months later, this patient, who had always shown perfect cerebral equilibrium and remarkable physical and intellectual activity, became seriously depressed and sad, with abulia, inability for all kinds of work, and cenæsthesia. This condition persisted for almost a year and then disappeared so completely that he was able to take part in the present war and, starting as artillery lieutenant, gained the rank of head of the squadron."

The prognosis of the prolonged contusional condition is similar to that of the commotional condition, when this dominates, that is to say, it is generally favourable, but recovery is often a long distance ahead. The prognosis, which is infinitely variable,

is that of localized lesions, when these follow in the steps of the diffuse disturbances of the commotion, and when the commotion itself remains moderate.

III. EMOTIONAL PATIENTS

The large majority of emotional patients return to the front cured, without reaching the inland zone. Grave and persistent post-emotional disturbances are relatively exceptional; should their number appear fairly considerable to those who observe them in neuro-psychiatrical centres, it is surprisingly limited in the case of observers on the field of battle. Thus, a mass of human beings are able to live during months and years in the most deplorable material and moral conditions, passing through the most violent and frequently repeated emotions, trials which seem superhuman, and are hardly momentarily agitated by some more intense or immediate emotion. "The moral resistance of a well-balanced soldier seems to rise above all emotions of war" (56).

Nevertheless, sometimes after the emotions persistent modifications of the mental or moral conditions are observed, mental disturbances or well-characterized mental diseases.¹ We are now about to describe the first, and shall discuss the second in the following chapter.

¹ Commotion is also capable of causing these morbid conditions, even when the patient has lost consciousness immediately, by the profound retrospective emotion he feels on awaking in a strange place and finding he has escaped a very great danger; but emotion is sufficient in itself and generally it is that alone which comes into play.

As similar emotions, equally intense and abrupt, cause the majority of essentially fugitive disturbances, amongst which only genuinely morbid, and more or less grave, conditions persist, there is no doubt that a certain degree of predisposition is necessarily added to the emotion itself, in the genesis of these morbid conditions.

At special meetings of the Societies of Neurology and Psychiatry, held in 1909-10 to clear up "the part played by emotion in the genesis of neuropathic and psychopathic symptoms," the conclusion was arrived at that, in a general way, the importance of predisposition, and of the emotional constitution had to be recognized in connection with the origin of the symptoms. But at that time we were enjoying a period of peace; there were hardly ever violent emotions (and these were never frequently repeated) like those to which to-day many men appear to be almost accustomed. On the other hand, amongst the personal or hereditary antecedents of patients suffering from post-emotional persistent disturbances, it was but rarely that any signs of anterior emotion, or of slight psychical disequilibrium were found; in default, some anterior emotion was reckoned as excessive, and consequently a sign of abnormal emotion.

The war, an incomparable psychological experiment, seems to have shown the real and considerable importance of predisposition, seeing that, in the midst of a multitude of violent emotions, hitherto unsurmised, the nervous and mental equilibrium of a relatively small number of patients appears to be affected seriously and for a prolonged period. But, at the same time, it has become recognized more and

more that, if a moderate emotion is sufficient to induce serious disturbances in any one with a marked predisposition, a very violent emotion, on the other hand, may quite well be associated with a very weak predisposition. One might say that the emotion is sufficient in itself, and it is especially in these cases that one must examine well into the patient's antecedents to find some signs of emotional abnormality, right up to the indefinite frontier of a normal disposition. This proportionally inverse part played by emotion, the occasioning cause, and of constitutional emotion, the predisposing cause, has been acknowledged by all authors (Dupré (69), Devaux and Logre (56), Chavigny (40), etc.). Indeed, it is certain that in war practice, congenital predispositions, no matter how real they may be, count as very little in the clinical picture, compared with the considerable morbid importance of emotional shock.

But there are other predispositions which, in war practice, have an unusual importance, and these are created by the emotions themselves. The multiplicity and the repetition of emotions, acting on a depressed condition arising from a whole series of causes of physical and psychical strain, are the origin of an acquired emotive constitution. This again, in its turn, by a sort of vicious circle, has as a consequence the exasperation of ulterior emotions. Séglas and Barat (217) state that, "moral shock has not only permitted the manifestations of pre-existing tendencies, it has itself contributed to the creation of morbid predispositions. In this way, these patients approach Lasègue's 'cerebral' cases, victims of a cerebral disturbance, who have definitely lost

their 'cerebral virginity' and, after their recovery, retain a pathological susceptibility, a cerebral vulnerability which exposes them to further disturbances under the slightest provocation." Thus, a certain anaphylaxis is opposed to emotions, owing to the fact of being used to them, which is happily the rule; but in its genesis, it must be stated, one is obliged to find a certain degree of more or less constitutional predisposition.

Manifestations of syndromes are found, which may be termed emotive neurosis and emotive neurasthenia. These disturbances are often found to develop as the result of multiple emotions of varying importance and often of dissimilar nature; they are not mental diseases in the proper sense of the word, but physical and mental conditions, after the style of those of emotional patients: we shall now describe them and give some examples.

1. *Emotive Neurosis*

Babinski has suggested that a certain number of facts should be designated by this name, which hitherto have been included under the vague denomination of traumatic neuroses, although they indicate neither physical traumatism nor pithiatism. Meige has justly delimited this emotive neurosis to "the whole of the accidents, which may be considered as a prolongation or unusual amplification of physiological phenomena commonly accompanying emotion." Dupré (70, 71) has rightly insisted upon the importance of psychoneurotic emotion.

The picture of prolonged and exaggerated emotion is observed at the present time in the pathology of war: many authors have already reported isolated

facts of a syndrome which, although but little known at present, is really almost commonplace.

Violent emotional shock, the type of war emotion, admits physiologically of psychical and physical determinations. Fear is the essential psychical manifestation; it is a normal and very natural sentiment, a simple form of the instinct of self-preservation, in no way opposed to courage, when it is not excessive; ¹ true courage does not consist in being unafraid, but in knowing how to overcome fear by an effort of will. Pallor, acceleration of the pulse and respiration, trembling and shivering, forcing of secretions, perspiration, polyuria, diarrhœa, etc., are well-known physical signs, the more or less immediate results of emotions.

With normal patients, as a rule, these troubles disappear a short time after the emotive shock. They are prolonged with the morbid emotional patients we are studying. Prolonged emotion is a condition of anxious, persistent, and permanent emotivity; it is the type of emotive neurosis.

From the mental point of view, this neurosis has been very well described in a few lines by Devaux and Logre: "After a severe emotional shock, accompanied or not by physical commotion and wounds, the brave soldier becomes a coward. He is shorn of his warrior courage. When he hears the guns, he is afraid, trembles and can neither hide nor conquer his confusion. He has been seized by a kind of emotive anaphylaxis; he can no longer victoriously resist the agony of the battlefield. . . . He is a moral invalid, one wanting in courage."

¹ "I should like to know," said Marshal Ney, "the dare-devil who has never been afraid!"

Shells are what most frequently make these patients afraid at the present time, these neophytes in cowardice, as well as those who are cowards owing to their hereditary emotional constitutions. The recollection of the shell explosion, nearly always the origin of the troubles, remains extremely vivid in their imagination and genuine shell phobia develops.

This phobia may even result in the patient's impulsive flight and abandonment of his post, either in the trench at the moment of assault or when going into the lines. It is instinctive and irresistible, invincible; the soldiers can only give one invariable explanation: "It overcame me." What demonstrates clearly its truly pathological character is that, up to a certain point, it is independent of the fear of death. Certain phobic patients escape at the first sound of guns, although they are in relative security in a dug-out and know very well they are likely to encounter a shell during their flight; others will run away several times, although they have been punished and are certain they will and by being shot.¹ Further, certain phobics will commit suicide, from their fear of shells and the disciplinary punishment that might ensue for them.

On the other hand, it is not always the shell itself which emotional patients dread the most, it is often the noise; they acquire a genuine phobia of sound, and sometimes, because the cannon is essentially such a noisy weapon, they have, above all, cannon phobia. They are as frightened of the departing shell as the arriving one, and flee directly they hear

¹ Cases of this kind have been quoted by Pactet and Bonhomme (190), by Laignel-Lavastine (111), etc.; we also have observed several examples.

it, or even if they see a cannon going to be fired. Some of them are frightened of everything; it is not only fear of shot and shells, or fear of the cannon and its noise, but also fear of fire, of microbes, of animals, of dampness and dryness, fear of air and of the want of air, finally, fear of madness! These pantophobics evidently have a great predisposition, and certainly the occasioning cause, the emotional shock, here plays a more limited part in relation to the predisposing cause, the emotive constitution, than in the preceding cases.

We have said that courage often consists in overcoming fear, a legitimate, natural, and, to a certain point, useful sentiment, by means of an effort of volition, which subordinates the individual instinct of self-preservation to a higher interest outside the individual. It is also evident that anxious emotion, with or without a series of phobias, is first and foremost a disease of the volition; emotive patients, as Pierre Janet (108) has justly remarked, are mainly abulic. Abulic in their affectivity, they are so also in their speech and actions; sad, depressed, talking but rarely, they voluntarily live apart, hide themselves, move but seldom and have the appearance of endeavouring to be spoken of as little as possible.

Moreover, they are far from being unintelligent; and, paradoxical as it may seem, it may be said that their fear is to a certain extent in proportion to their intelligence; "the more one knows, the more one comprehends, the more one should understand fear, for the more one is informed, the more one knows the reasons for being afraid. To have no fear at all, it would be necessary to have neither intelligence, experience, nor understanding." It

would be more paradoxical to apply this theory to excessive and to morbid fear. But it is none the less certain that if hypermotivity is really a form of disequilibrium of the volition, it is certainly not *en rapport* with intellectual disequilibrium. True, there are many emotional patients who are weak or degenerate, but this is not the rule, and Régis has proved that "in a general way neuropaths and the most emotional delirious patients are also the least degenerate, if not the most intelligent" (201). In fact, emotive neurosis appears to be found amongst officers, if not by predilection, at any rate most frequently relatively.

It is conceivable that, in certain cases with persons of superior intellectual culture, especially officers, this pathological cowardice may become a veritable obsession. The patient, for such indeed he is, is ashamed of his anxiety, he is afraid of being afraid and above all fears that anyone should notice it and lodge a complaint against him, he is afraid that his terror should dishonour him, and above all that it should make him take to flight. Urged by the quite legitimate, but opposed, double desire of hiding his moral taint and confessing his infirmity so as to guard himself against the consequences, he speaks to the doctor, his comrades, and his chiefs. All this is barely understood by the commandant, who, as Laignet-Lavastine (111) says, cannot conceive of any mean between the war council and a lunatic asylum. The patient is practically estranged, considered more bother than he is worth and hustled out of office, but he has often remained fully conscious of the most elevated moral sentiments, and has a clear idea of his own inferiority. He feels

that he is despised or believes that he is, and often despises himself. It is in cases of this kind especially that suicide is not very exceptional.¹

Anxious emotive patients, concentrated on their own anxiety, are naturally inattentive, heedless in the vulgar sense of the term. They forget what they are doing, the commissions they are charged to carry out, what they have been reading, what are trumps when playing cards, the pavement when they go into the street, etc. It is evident this forgetfulness is due to the faculty of attention being interfered with, and has only a relative relationship to genuine memory disturbances, with which there has been a desire to assimilate it.

From the physical point of view, a whole series of troubles are joined to anxiety, "emotion character-

¹ This condition of hyperemotivity is observed in three degrees : agitation, anxiety, anguish, not only as the result of the intense emotions of the battlefield, but also fairly often, without any emotional shock, but certainly with more predisposition, in soldiers who have never had any but commonplace, yet almost continuous, emotions, in trench life ; Mallet has recorded some interesting examples (164).

This is precisely the same condition that M. Rénon (204) has described amongst civilians, under the name of war anguish, "whether amongst persons who have someone they love in the army, or with individuals whose material and moral situation has been upset by the war, such as refugees, or persons whose affairs have been more or less compromised. They may be injured neither in their affections nor in their interests, but, being very patriotic, they have taken greatly to heart the destiny of the country they dread to see founder in the general tumult. . . . War anguish is evolved above all in the neuropathic and arthritic regions. . . ; its evolution has a direct relation to the military and diplomatic situations ; it becomes aggravated at times of great military activity." Its symptomatology embraces all the mental and physical disturbances of emotive neurosis.

ized by a condition of moral pain and uncertainty," according to the definition of Devaux and Logre; these physical troubles are only the prolongation and often the exaltation of those which accompany emotion itself; independent of volition, they clearly distinguish emotive neurosis from the manifestations of hysteria or of simulation. These disturbances are always paroxysmal and may, or may not, go as far as the sensation of physical constriction which constitutes anguish.

Tachycardia is one of the essential and most constant physical elements of the clinical picture; it is one of the best diagnostic signs. The pulse beats between 90 and 110 times per minute, often 120, and exceptionally up to 140, for months at a time. As a rule the patient is not conscious of this acceleration; sometimes he will feel his heart beating, at any rate for some moments, and have palpitation or even very painful transitory sensations of breathlessness or suffocation.

On auscultation, the heart is often erethic, the point is lowered and above it an extra-cardiac meso-systolic murmur is heard. The pulse is sometimes arrhythmic, in any case it is very unstable, and much accelerated or retarded during the same examination, if there is the slightest movement, independent of any emotion.¹

¹ There is no doubt it is with these arrhythmic tachycardiac patients, sometimes regarded as myocarditics and at others as simple neuropaths, that Jean Lépine (121) must have proved a physiological cardiac insufficiency which, when doing hard work, might lead to serious trouble owing to the forced action of the heart. •

Alfred Martinet has alluded to quite analogous facts, which he has entitled "cardiac neuroses" (173). All the small vaso-motor

Other physical disturbances are not nearly so valuable, for they are less constant or permanent, and certain of them are less markedly involuntary. They are very rarely associated, but the conjunction of some of them is of diagnostic value. The grouping below is artificial and merely for the convenience of description.

Respiration is accelerated but superficial, with a painful and convulsive inspiration.

Rapid vaso-motor modifications make the face either pale or red and swollen; there are frequent rushes of blood to the head; sudden and profuse attacks of perspiration; the feet and hands are cold. On getting up the impression of the bed is often left upon the patient's back, like a large red placard; on going to bed, the ankles are often violaceous and sometimes slightly œdematous, although there is no albuminuria. Frequent dermatographism; almost

signs, secretory, sensory, reflex, etc., which he gives correspond to those we shall describe below; this author, moreover, acknowledges the influence of emotions in their genesis. According to him, what is important from the point of view of prognosis and disposition, is not the strength of the cardiac reserve, which would be excellent ordinarily, but the power of resistance and of nervous reaction.

The tachycardias of combatants (and often of soldiers at the base as well) have been noticed by numerous authors, and latterly studied, especially by Gallavardin (Tachycardiac neuroses) (77), and quite recently by Aubertin (War Tachycardias) (3). This last author notes that they are not *en rapport* with commotions, but he is in doubt as to the causal importance of emotions, especially as they do not seem to be aggravated by fresh intercurrent emotions.

The majority of these authors affirm that tachycardia is generally accompanied by moderate and inconstant *arterial hyperension*. On the other hand, hypotension is the general rule with commotional patients.

as often as a red line, a large and persistent white line appears under the tracing of the finger, which is so frequently observed in all conditions of asthenia, without, however, the suprarenal capsules seeming to be specially affected.

Pain and various disturbances of subjective and objective sensibilities are like current coin. Headaches are frequent, in the form of permanent and diffuse heaviness, with sharp and fleeting paroxysms, without precise localization. Vague and disseminated pains run through the limbs and the trunk, without any relation to a nervous or vascular dissemination of any kind. The patient starts at the least contact with his skin; it is, indeed, erethic, but without genuine tactile or painful hyperæsthesia; according to the common expression, "the nerves are on top of the skin." The sensory organs are also hypersensitive, but specially the sense of hearing; the patient has a tendency to isolate himself and seek dark places. Above all, he has a horror of noise, the slightest crunching sometimes being painful to him, while violent shocks cause genuine agony and become insupportable.

The tremor is commonplace, regular or irregular, most frequently discontinuous, at least at night, sometimes extremely tenacious.¹ Vertigo is frequent

¹ The tachycardia, tremor, and vaso-motor disturbances form part of the habitual syndrome of emotive neurosis; these manifestations are certainly sufficient for a number of authors to use as examples of "Basedow's worn syndrome," syndromes which have been so much abused during recent years. But in certain cases to all these troubles are added either exophthalmia, goitre, or the two together, giving the complete symptomatic tetrad of Basedow's disease.

Laignel-Lavastine (110), du Roselle and Oberthür (219), Bérard

in the form of dizziness, rather than true vertigo ; insomnia is habitual, and sleep is interrupted by nightmares on warlike topics. Digestive troubles are not unusual in the form of anorexia, heaviness of the stomach, distention, acidity and burning after food, sudden attacks of diarrhoea, which pass quickly and return.

The tendon reflexes are commonly excessive in their rapidity and amplitude, but are not constant.

Anxious emotive patients suffer from fatigue, depression, asthenia, indecision, and impotence ; every effort is distressing and often almost painful to them.

Finally, the tendency to spasms, one of the characteristics of the emotive constitution [Dupré (69)], may at times become of such a nature as to give rise to the sensation of physical constriction which constitutes anguish.¹

(22) Babonneix and Célos (12) Merklen (180), Lénicz, etc., have reported cases of exophthalmic goitre occurring in combatants. We ourselves have observed some cases, but not often. On the other hand, certain inland doctors are said to have seen it frequently ; the difference perhaps is due to the fact that the symptoms can only develop progressively and have only been diagnosed inland. All the same, du Roselle and Oberthür saw one case develop completely in a few hours, but there is no doubt this is exceptional.

Intensity of the emotions does not seem to be necessary for the development of this syndrome ; in the majority of cases reported the patients had not experienced any extraordinarily violent emotion, and Professor Pierre Marie, who has seen many cases of goitre amongst soldiers, told us that in general, their starting point was not a very violent emotive shock.

Whatever it is, the recrudescence at the present time of masculine exophthalmic goitre, specially military goitre, is an interesting contribution to the emotive pathogenesis of this disease. e

¹ Devaux and Logre quite properly draw distinctions according to the varying site of this constriction : respiratory anguish (impression

All the very varied localizations of agonizing constriction are observed in emotive neurosis; these are found especially at the moment when the emotional patient cannot escape from the cause of his anxiety, that is to say, nearly always at the time of bombardments. Sometimes, however, the return of genuine attacks of panic terror is observed when there is no apparent reason; they often occur at night, after preliminary drowsiness interrupted by nightmares. The physical anguish is sometimes so predominant that it seems to direct all the sensations and psychological manifestations of emotivity. Probably certain patients are not altogether wrong when they state that it is only because of the tightening in their throat that they are afraid, or seem to be frightened, just in the same way as other patients only seem gay or sad because they are laughing or crying.

Whether apparently justified or not, these attacks of anguish may be accompanied by lipothymic disturbances, true syncope, with pallor of the face, diminution or even stoppage of the pulse, coldness of the extremities, manifestations which are likely to profoundly impress those around, as well as the doctor himself, although he finds no sign of any organic cardiac lesion. Devaux and Logre (56), Charon and Halberstadt (36), have observed syncopic disturbances of this kind, emotive ictus. We our-

of distension, throat tightened, choking; broken voice, aphonia, stifling, imminent asphyxia, suffocation; thoracic gripping, epigastric barrier); Digestive anguish (impossibility of deglutition, stomatic weight and feeling of oppression, cramps, colic, tenesmus); Cardiac anguish (cardiac clutch, tightening of heart, palpitation); Cephalic anguish (constriction of temples, empty feeling of head, facial mask tragic and concentrated, sunken, grimacing, and convulsive).

selves observed a whole series in an officer who, some short time previously, had suffered from violent emotional shock, owing to the explosion of a shell quite close to him. We only succeeded in determining the exact nature of the disturbances when we noticed that these attacks, which at first occurred without apparent cause, were later repeated each time an enemy aeroplane was signalled near our field hospital. It is not necessary to state that these attacks have nothing in common with hysteria, except, as Devaux remarks, when the patient more or less unconsciously enlarges and embellishes them with some supplementary setting.

The following are two abridged examples of observations of this emotive neurosis.

(i) *Repeated Emotions. Shell. Phobia. Impulse to flee. Obsession of flight. Tachycardia*

François, aged 21, farmer, foot-soldier, was in a trench in June 1916, when a torpedo exploded against the splinter shelter; this, which was made of earth held in position by wicker-work, fell behind him, but without bruising him. He remained in his place stupefied, deaf, and unable to articulate a word for nearly three-quarters of an hour; his sergeant then came in search of him and took him into a shelter; he again took up his position at the end of a few seconds.

From this time onwards, he has been the prey of excessive and increasing emotivity; he is a good soldier, formerly very brave, and has continued to serve, but a slight wound of the hand, received two months later, was the climax to his anxiety. Since

then he has been unable to bear the sound of the bursting shells, no matter whether the explosion was near or at a relative distance; directly he hears a shell fall he becomes incapable of making a movement, or he may suddenly begin to run distractedly in any direction. This emotion is to a great extent independent of the idea of danger, for the disturbance takes place just the same if he is in a dug-out and there is no immediate danger; he will remain immovable in a corner, incapable of speaking, of eating, or of executing any order whatever; if the bombardment continues he has an irresistible impulse to rush into the trench without knowing where he is going, even if he is obviously running into the greatest danger.

The patient, who appeared to give his explanations in all good faith, was haunted by the idea that he was fated to run away altogether one day, that he would desert, and "be no longer be able to resist doing so." He did not ask to be evacuated, and the sergeant was so struck by his attitude, so absolutely different from what it was before, that he sent in a report to the officer in command of the company. He had the soldier examined by the regimental doctor, a competent neurologist, who, after keeping the patient under observation for twenty days, advised his being put on half-pay.

Pulse 92 when first examined, 112 at the following examination; beat good; it remained permanently at this high figure during more than a month of observation. Heart erethic; no arrhythmia, no modification of sounds.

Respiration easy, 18. No digestive troubles, no diarrhoea. Neither excessive perspiration, vaso-

motor troubles, nor 'heat waves'; nevertheless the patient slept badly and attributed his insomnia to impressions of excessive and distressing heat. Headache, with sensations of vertigo, occurring from time to time and lasting about a quarter of an hour. No objective disturbances of equilibrium. Hearing and vision good. Tremors of whole body, motor instability. Pupils rather considerably dilated, a little unequal, reacting moderately to light. Reflexes of upper limbs strong (the patellar reflexes are very feeble and Achilles reflexes absent, probably owing to former slight infantile paralysis).

(ii) *Commotion; recovery. Anxious emotivity, syn-copal anguish, nightmares. Shell phobia, noise phobia. Obsession of flight. Tachycardia.*

Gallien, aged 26, farmer, artillery-man. On 13th August 1917 he was behind a 75 gun which burst; he was thrown violently to the right and immediately lost consciousness. Came to himself on reaching the field hospital three hours later. Neither hæmoptysis, otorrhagia, nor epistaxis. Violent headache, continuous 'buzzing of the ears, intense lassitude.

The following day, stupor and general fatigue. Slight mydriasis of pupils, equal, reacting slowly. Hearing much diminished on both sides (heard watch at 1 or 2 centimetres). Pulse 73, regular and well marked. All tendon reflexes very strong, plantars flexed. No motor, sensory or sphincter disturbances. Left at end of ten days, apparently all right, although still a little tired; sent on convalescent leave.

The day after this soldier returned from leave he was sent to a battery position, and at once subjected to bombardment. He had never been afraid before and always behaved well, but now he at once began to tremble and experience sensations of weakness extending to syncope; directly he went to sleep he had terrifying nightmares with visions of battle. As it was impossible for him to serve he was again sent to us on 12th October.

He was pale, pulse 90, unstable. General condition good. He had a phobia not only of shells, but also of sound. Above all, he had qualms about going back to the battery, as he was certain that at the slightest detonation he would run away terrified, incapable of all effort of will. He had no loss of memory, except of a few hours following his commotion due to the bursting of the cannon; he gave all information as to the working of his battery well, knew quite well what he was doing and why he was doing it.

Emotive neurosis is always an affection of long duration, lasting months or years. It is often immutable in its form and manifestations in debilitated patients, and may then be reduced to a single phobia, for example. In an intelligent patient, especially when there is predisposition, as in the case of our last observation, it may assume all the various forms of obsessions, impulses, phobias, pseudo-hallucinatory illusions, which nearly approach to characteristic mental disease: the intellect interprets, multiplies and amplifies the sensations arising from the animal part of the human organism, and creates from these a species of genuine polymorphic delirium.

The multiplicity of the emotions is one of the most powerful elements in the genesis of the neurosis ; as if by a kind of emotive anaphylaxis, they act less by their intensity than by their repetition. After a certain time the most moderate emotions, which previously would have passed unnoticed, have a greater noxious action than intense emotional shocks had formerly.

The duration and intensity of the neurosis, as well as its genesis, depend upon the extent to which the patient is exposed to a repetition of the emotions. Now, life at the front is nothing but a series of emotions, small or great. This means that it is not suitable for emotional patients, and the quickest way to effect their cure, which should be complete in order to enable them to serve again, is to remove them from the front for the time being and for a fairly long period, and to obtain the quietest life possible for them.

2. *Emotive Neurasthenia*

Neurasthenia is essentially a syndrome of fatigue, the result of excessive and prolonged physical and psychical overwork. As emotion is one of the chief causes of physical and mental overwork, it might be supposed, *a priori*, that an enormous crop of neurasthenics would result, as war is an uninterrupted series of fatigues and emotions for all the soldiers at the front, and for a large number of military and civilian individuals in the inland zone. But it is proved that this is not the case at all.

Civil doctors, accustomed to false gastropathic, cardiac, and urinary diseases, are unanimous in

stating that they have seen the disappearance, as if by magic, of "sofa cases," and patients suffering from palpitations,¹ undergoing "regimes," etc.

Army doctors state that, if neurasthenic depression obliges them to evacuate a certain number of soldiers and officers as unfit for the time being, at any rate, it is not an ordinary form of war disturbance, and is not more frequent than in civil life. It even seems to be less frequent than in ordinary life, if the same limited value is given to the term neurasthenia that is applied to it in times of peace, and if it is not unjustly made to include a series of psychopathic symptoms, obsessions, phobias, attacks of anxiety, confused, melancholic or hypochondriacal conditions, vesania, manifestations, etc.; which are not an integral part of the true disorder.²

The comparative rarity of neurasthenia at the present time seems at least to prove that neither fatigues nor emotions alone cause it, whether isolated or associated, intense or prolonged. The fact is remarkable, for it is opposed to many theories. It seems to be due to two causes: (1) the necessary consequence of the hereditary or acquired constitutional condition; (2) the favourable influence of occupation, of usefully employed activity, of the life

¹ We are of opinion that it is much more fitting that pseudo-cardiopathic patients of a melancholy tendency, of whom Martinet (173) says, "war has exercised a favourable action on them and they no longer feel their heart," should be classified under neurasthenia than under emotive cardiac or tachycardiac neurosis, etc.

² Even before the war H. Meige (176) expressed his regret at so often seeing a whole series of psychopathic elements wrongly incorporated amongst the fundamental symptoms of neurasthenia, which appeared to complicate a very simple picture.

in common which, by the excitement it causes, to a certain extent counter-balances the depressing effects of fatigue and emotion. A man in the midst of the cares and responsibilities of a military command, a woman leading the active life of a nurse, has no time for personal consideration. Neurasthenia is above all the disease of people who think too much of themselves, and, one might add, of those who, up to a certain point, have always done so. However, the rarity must not be exaggerated; although certainly not very frequent, emotive neurasthenia is not exceptional.

Like neurasthenia in civil life, it is not, as a rule, the consequence of a violent and forceful emotion; it mainly succeeds a whole series of small fatigues and continuous minor emotions, better still a series of the preoccupations and relative anxieties which constitute life at the front.¹

Gilles (79) has drawn a fairly accurate, original, and vivid picture of this war life in the trenches; in the first place, there is constant watching, always in ambush, the whistling of the bullets and bursting of shells, the deafening and blinding struggle with grenades and mines. Then in the rest camp, that is to say a few kilometres behind, in all the sectors said to be quiet, there is a whole series of little miseries, which are in no way less irksome than the more apparent dangers at the extreme front; but the continuity of which is certainly more depressing. Then there is the absence of shelter against shells

¹ Déjerine says, neurasthenia is the "disease of emotive pre-occupation." Meige remarks, "a strong emotional shock less frequently induces neurasthenia than incessant worries or the interminable complications of a difficult existence."

and aviators' bombs, the sensation of invisible risks, which are constant; impossible to foresee or to avoid; the distressing or repugnant duties, the absence of comfort and ease, the dampness, the half-frozen mud, insomnia owing to parasites and rodents, the promiscuous intercourse, half starved emotions and unsatisfied sensuality, the incompatibilities of temper, of character and social levels, the conflicts of prerogatives and degree, the monotony of life, the inaction, relative and forced unemployment, etc. As if all these worries and annoyances, preoccupations and emotions of military life were not enough, it is nearly always in the case of people who at the same time are bearing some sorrow affecting their personal or family life, that neurasthenia develops at the front. Thus a man who has admirably resisted all the fatigues and emotions of military life, will flag suddenly as if the elastic had snapped all at once, owing to the tension being too great on the occasion of some personal annoyance. It seems as if, despite all the continuous alarms of certain war situations, civil emotions and preoccupations often play a preponderating part. Thus, we have seen neurasthenia develop in a patient when his father, who had proved himself a hero and a worthy object of pride, was seriously injured in a commonplace street accident; another man had had his family detained in an enemy country at the outbreak of war and interned in a concentration camp, where one of his relations had died.

With patients affected in this way, as much by a more or less constitutional predisposition as by the multiplicity of repeated emotions and fatigues, an emotional shock might figure as the occasioning

cause and release the disturbances : this, however, would be nothing but the drop of water which causes the vase to overflow. It is conceivable that a strong emotion is not necessary and is very often absent, contrary to what we have said with regard to emotive neurosis : the patient will become progressively neurasthenic and apparently without cause.

As in civil life, neurasthenia is essentially a disease of intelligent people of the higher classes ; in the army it is observed almost exclusively either in officers, non-commissioned officers or soldiers of a superior rank.

Moreover, the military neurasthenic is very often only a civilian transported into military life and insufficiently uprooted, owing to his temperament and habits. What we have said, as to the part played by the former constitutional condition and the favourable influence of the change in life, explains why neurasthenia is produced especially in those who have altered their occupations the least, for example, bureau officers, motorists, etc.

There is no difference between the neurasthenia of a soldier and that of a civilian ; in the same way that it merely owes part of its variations to war life, so military life only adds a slight and accessory tinge to its symptomatology.

In neurasthenia, it is always the sensation of asthenia that dominates, rather than real asthenia. This sensation of incapacity to act and think is sometimes only an illusion, for, in cases of necessity, the neurasthenic proves he is capable of vigorous effort or of reasoning just like anyone else, but he is incapable of maintaining this effort or persevering

in this physical or mental activity; ¹ tired before, he is exhausted after.

In contradistinction to the melancholic, he has retained his desire for an active life, and it is the inequality between his desires and his powers that gives the neurasthenic his essential characteristic: he is nosophobic and hypochondriacal.

Attacked by cenæsthenic discomforts, a distressing and inadequate sensation of the uncertain working of all organs and muscles, he has headache, vertigo, spinal neuralgia, pains and hyperæsthesias, as badly located as they are disseminated, anorexia, and sluggish digestion, distention and palpitation, genital impotence, insomnia, and, above all, a feeling of insurmountable and permanent fatigue.

He exaggerates all these vague sensations, as it is impossible for him to give them their true value. The pathological conscience exaggerates, the fear of not being cured dominates his existence, and the hypochondriacal neurasthenic, incapable of a sustained effort of thought or volition where his own health is not at stake, is only obsessed by himself. In the fear of never recovering, or of becoming insane, he will sometimes commit suicide.

Quite different from the commotional patient, he remains capable of action, of even exuberant loquacity, and intellectual vivacity, as long as it is a question of his favourite subject, his own health. Very different from the emotional patient, his only anxiety is for himself, his organs, his brain, or spinal

¹ The ergographs taken by G. Ballet and Phillipe (16) show the neurasthenic is capable of making the same effort as a normal subject, but once exhausted, is incapable of pulling himself together again in the same time.

cord, his heart or his stomach. To illustrate by a different series of ideas, he is to the emotional patient what the melancholic is to one suffering from mania of persecution; the cause of all the evil that may happen to him is to be found in himself, whereas the anxious emotional patient only fears dangers with an origin outside himself.

It is conceivable that such a neurasthenic exhausts himself physically, so that at a given moment disturbances of nutrition, emaciation, and generalized hypotonia are hardly ever absent. It may be asked whether they have been the starting point or the result of the depressive moral and intellectual condition; and, indeed, it soon becomes difficult to tell whether the physical or the mental stands first, both, by a sort of vicious circle, becoming mutually completed and aggravated.

In this roughly sketched clinical picture there is nothing special in emotional military neurasthenia apart from the etiological circumstances. The military colour is, however, rarely altogether absent: if the patient dreads all the effects of his illness, it is because he is afraid he may be unable to fulfil his mission; if he is afraid of becoming insane, it is mainly because he will no longer be able to keep his commission and will be thrown out of office; he knows quite well that he is incurable, and a glorious death on the field of battle would be a deliverance. Meanwhile, he begs that he may be evacuated as soon as possible, because he feels too weak to continue hearing the noise, "sleeping on straw, or living in such deplorable conditions of hygiene and regimen, and because evacuation inland is the only possible remedy.

It is also in this question of evacuation, although it is not always pressed with the same urgency, that the emotive neurasthenic shows one of the characteristics of a war malady, and, indeed, the patients are not altogether wrong when they declare that evacuation is their only remedy. Further, it must be done without delay, a neurasthenic treated by calmness and change of scene will have a rapid and favourable recovery, independently of the relapses which are almost the rule; while if treated with scorn, there is every chance of the illness being prolonged, aggravated, and complicated. Indeed, if neurasthenic depression is sometimes nothing but a complication of emotive neurosis, more frequently "neurasthenia, which admits of anxiety reactions of a somewhat special character particularly of a hypochondriacal nature, sensitises constitutional anxiety and the predispositions to obsessions; it favours emotion; and any nervous system, debilitated originally or secondarily in its power of resistance, offers a propitious ground for the development of the emotive constitution" [Dupré, (60)]. Emotive neurosis also is frequently, especially at the time of some strong intercurrent emotion, a complication, or a second period of emotive neurasthenia, and the two periods prolong or aggravate each other.¹

The following is an example of a complex and prolonged case of neurasthenia and emotive neurosis.

¹ This is why certain authors, like Gilles (79), have confused the two varieties of disturbances in a clinical description which, all the same, is very good; from our point of view, this is a mistake.

Emotion, very slight commotion. Period of neurasthenic depression, with illusions or slight hallucinations. Period of emotional anxiety, with recurring and obsessional anguish during bombardments.

Hilaire, officer, in September 1915 was in a zigzag trench at the time of an attack. He was caught in a very violent barrage fire ; his men were nervous, he himself was unhinged ; to give them an example of coolness, he leant up against the side of the trench, lit his pipe and began smoking. From this time his memories are very vague, but not non-existent ; he thinks he was thrown by a large shell into a shelter, which collapsed on him ; he had intense pain in the loins, felt himself pulled up by his men and someone saying : " Lieutenant, you must come," and he went by himself into a neighbouring dug-out ; he does not think he lost consciousness at any time. He was evacuated to a hospital, where he remained for a month and a half. During this period he was very tired, with headache and spinal neuralgia, sleeping little or not at all, he felt that he had deteriorated from an intellectual point of view. He was no longer himself, was afraid of not knowing what he was doing, of having lost his head, and his great preoccupation was that his family should not come and see him in this condition. He could not read for more than a few consecutive minutes without losing interest in what he was reading ; could only write just enough to give news of his health and prevent his people from coming. He could count, and argue a little, had no confusion as to time or space, had no genuine amnesia.

From time to time he thought he heard the whistling of shells ; all the same, he knew that, at the distance he was from the front, with an effort he might hear the departure and arrival, but not the whistling. Did he believe this whistling was real or not ? I cannot say. He had nightmares and sometimes, as it were, a species of nightmare while quite awake ; he saw war incidents, but these were purely imaginary without any relation to the accident that occurred to him personally ; the memory of which did not obsess him at all. • One day, while walking, he quite clearly saw a blood-stained ladder in a passage ; did he believe in the reality of this or not ? Was it an illusion or a genuine hallucination ? He could not say. At this period, on hearing shells exploding in the distance, he had no impression of anguish and did not feel that his moral sense had diminished.

On going for his convalescence to Paris, he felt so tired and inconvenienced by the noise around him, that he went home, shut himself up, and then, refusing to see his friends, afterwards left for the country.

When he returned to his company there were several officers he did not know. He remained eight months, partly in a fairly lively defensive sector ; his behaviour was neither good nor bad, no shells came nearer than 200 metres, sometimes he had a slight tremor. During the sixth month he went into a very lively first-line sector ; directly he arrived, he took part in an attack, and it was then, for the first time, that he had the impression of not being quite equal to his task.

Frequently bombarded, even during so-called rest periods, he was seized at each bombardment by a

sort of physical reaction, with trembling, shaking of the legs, contraction of the jaws, semi-yawning, aphonia, epigastric constriction, and feeling of complete emptiness of the head, palpitation of the heart, in fact symptoms of anguish. But he protested loudly against the idea of any moral fear, unworthy of himself, and his own and his family's antecedents; the fear of death counted as nothing in these symptoms, he had more anguish than anxiety; even in moments of anguish he was in no way obsessed by the memory of his old accident.

Some time later he went to see the regimental doctor, told him he was not equal to his task, and was evacuated. Three months afterwards he returned to his depot, where he was pronounced unfit; but wearying quickly of the life of relative inactivity, he almost at once begged to be allowed to return to the front, and was permitted to do so.

A short time afterwards, on the occasion of an aerial bombardment, the same sensations of agony returned. He was given a post at some distance from the lines; but directly he heard a bombardment, at rather close quarters, he went out and hid himself in a corner, because he began to tremble, to yawn, he felt as if his legs were cotton wool and his head empty, and was haunted by the fear that this might be noticed. One day, however, he found that some officers had observed him. He himself had confided his position to his General. He was sent to our Centre.

He is very intelligent and gave a good account of his condition, analysing his moral sufferings. He is very conscientious, a little doubtful and scrupulous in his replies, speaking with deliberation, giving

complete evidence of good faith. Full of dignity, with his anxious emotivity, he described his dread that this hyperemotivity, so foreign to his former self, should be mistaken for fear; he would willingly take no matter what post, however dangerous it might be, where his troubles would not be seen; but he became pale and ready to weep at the idea that his physical reaction should deprive him of all his power at the moment of danger.

He had formerly presented certain outward signs of emotivity, which may be regarded as exaggerated, for example, one day at the time of an examination, another day when going to speak in public, etc. It may be noted that deep personal sorrow was added to his war preoccupations: he had recently lost one of his near relations in a commonplace accident.

General condition fairly good. Pulse between 90 and 110. Tendon reflexes strong. Slight subicterous, emaciation, loss of appetite.

CHAPTER VII

MENTAL MALADIES FOLLOWING COMMOTIONAL AND EMOTIONAL STATES

WE have up to now described the usual mental state, as it were, of commotional and emotional patients, a condition sometimes more or less subnormal, at others nearly approaching madness. Very rarely, but not exceptionally, real mental symptoms follow. These mental symptoms are described with much care and skill by Professor Jean Lépine in another volume of this collection;¹ we confine ourselves here to a few remarks.

The most frequent of the mental afflictions of the war is *mental confusion*. It is that which represents best the "acquired pathology of the healthy man," as Devaux and Logre put it: where the predisposing causes, regarded as of capital importance in mental pathology, give an easy path to the consequences attending a sudden violent shock, but in the actual conditions the violence of the physical or mental shocks, commotions and emotions, seem to play a particularly effective determining part.

In fact, a number of war confusional cases, observed at the present time, seem to be simply

¹ The book of Professor Jean Lépine, which is very full of new and interesting observations, has appeared since the writing of this chapter; the present volume was too far advanced in the press for us to include the whole argument.

predisposed by their hereditary and personal antecedents; and the keen and weak partisans of predisposition invoke constitutional predisposition less than acquired predisposition. In common with the partisans of necessary and obligatory toxoinfection (to the point that toxoinfectious etiology would even be one of the elements in the definition of mental confusion), they incriminate the gastrointestinal disturbances, so common in soldiers, especially at the beginning of the war, and the conditions caused by overwork and unhealthy conditions of existence. Others, observing, without apparent predisposition, confusional conditions following violent emotion in young soldiers just arrived at the front, and never having previously suffered from overwork or any gastro-intestinal troubles, believe that to the emotion itself must be attributed the capacity of inducing toxic or even toxoinfectious effects. These have caused the powerful emotion to interfere with the different glands, particularly the vascular sanguinary, the general cellular metabolism, the multiplication of microbes, etc. . . .¹

¹ Emotion might inhibit the working of the liver, kidneys, and intestines, as well as the salivary, lactive, and other secretions; the lactive and salivary secretions becoming toxic in the same way as the blood [Turck's experiments, refuted by Roger (207)]; the suprarenal secretion exaggerated [Cannon's experiments on a dog (32)], the hyperthyroid having as evidence post-emotional exophthalmic goitres, and even tachycardia and tremor, would constitute Basedow's worn syndromes [Lian, (146)]; emotion might liberate cytotoxines due to an unknown disturbance of metabolism [Hesnard (102)]; it would make the blood acid [Crile (48)] or cause destruction of the molecular state of the albumines, with hæmoclastic attack in anaphylactic disturbances [Joltrain (105)].

Wishing to keep within the domain of facts, we shall not start any discussions as to the pathogenic interpretation of this subject. We shall merely state that all these theories have but little compatibility with certain facts, which, however, are more rare than has been asserted, in which mental confusion has immediately followed a violent emotion.¹

In any case mental confusion appears to us to more frequently follow an intense emotion than a true commotion; with regard to this, we are in agreement with Régis (206), who considers that battle psychoses are essentially psychoses of emotional origin, physical traumatism being often absent, but not moral, emotional traumatism. Régis very justly notes also that phenomena of

This would permit of the abnormal multiplication of micro-organisms in the blood (Charrin and Roger's experiments on the rabbit), at the same time diminishing phagocytosis by the fact of vasoconstriction, etc. . . . (See Cygielstreich (50), Mairét and Piéron (58), etc.) . . .

Dupré has attributed certain exceptional facts of poly-neuritic post-emotive psychosis (69) and Bernheim certain myelites (23) to poisoning by general inhibition of innervation and exchange. It is certain that we have seen a number of cases of polyneuritis since the war, the pathogenesis of which has escaped us; but it is very difficult, under present circumstances, to delimit the part which is capable of being ascribed to the emotions, as too many other etiological conditions come into play.

¹ It is understood that we are not speaking of certain delirious attacks, often premonitory of premature or paralytic dementia, which may occur during the excitement of an attack, for example, and which, according to circumstances, now turn patients into madmen, now into heroes. We do not know any well authenticated cases of true mental confusion which, at the time of an emotional shock, suddenly precipitated the patient in the direction of the enemy.

psychical or nervous inhibition are only produced when the patient is out of danger and then to some extent lets himself go.

Even in cases of avowed commotion, it seems to us that very often there was an intermediate period between the motor and mental inhibition of the commotion and the mental confusion. Now, during this period of meditation, emotion has every reason to make itself felt very vividly, retrospectively, as it were, in the case of a patient who has been seized right in the thick of it, in the midst of a scene of carnage and horror, and who suddenly comes to himself in bed, without any idea of time or place, or any clear thought beyond the fact that he has miraculously escaped death!

Despite the frequency of battle-field emotions and of mental war confusional cases in asylums, in conjunction with the majority of army surgeons,¹ it does not seem to us that mental confusion, of an absolute kind, is very frequent. Of course the meaning of this clinical entity must not be extended immoderately, and it must not be reduced to a simple obtusion symptom, which is very commonplace.

Mental confusion of asthenic or stupid form is fairly rare amongst combatants, if it is not likened to the inertia of commotional patients, of which we have indicated the differential characteristics. Régis (200) notes that, if in the picture of war confusion various habitual elements of the syndrome are encountered, obtuseness, loss of localization,

¹ Dige and Lejonne (44), making observations for more than a year with a body of troops, did not meet more than three cases of mental symptoms of emotional origin

amnesia, torpor, it nevertheless often differs from typical mental confusion by its more sudden appearance, shorter duration, and essentially amnesic character. It is notably in confusional battle cases of amnesic type that Régis has observed an unusual number of cases of total amnesia, that is to say, extending over the entire life and leaving nothing remaining in the mind of the patient.

We have already stated what we think, in a general way, of the so-called amnesias of emotional patients; entirely based upon lack of attention, they disappear as if by magic, if trouble is taken to force the attention as soon as possible after the emotional accident, and thus revive the memories which are blurred but so far not extinguished. We are not yet convinced that the majority of these so-called confusional amnesias, even when total, differ much from the amnesias of emotional patients. Neither are we certain, citing an example given by Régis, that a soldier was really suffering from genuine amnesia who, when asked if he were married, looked down at his wedding ring and replied: "I must be for that is my wedding ring." The gesture and sentence necessitate the recollection and association of so many memories, some of them very abstruse, like that of the emblem, that we doubt whether, if the patient had been forced and there had been time, many traces of the amnesia would have remained. In any case, the totally amnesic soldiers cited by Régis were suffering from intense emotion, from shock from having seen some more or less terrifying sight, but without there being any commotion at all.

A form of post-emotional mental confusion, in

which the lack of attention is revealed with special intensity, is described by Chavigny (40) under the name of aprosexia: "Wide awake, the patient is at the mercy of all external excitements, but none of these are transformed into impression or are the starting points of a sensation or cerebral work. There is in it something resembling the condition of a young child who looks at everything shining, anything that moves or makes a noise . . . or again, this condition recalls the mimicry of certain cage birds who incessantly turn their heads in the direction of any noises or movements in the neighbourhood, without the slightest play of feature." Chavigny thinks that perhaps a condition of absolute, constant, and immediate amnesia produces the total incapacity of attention; by comparison with less complete, but more frequent, facts we should be inclined rather to believe the reverse, namely, that it is the lack of attention which results in lack of memory.

Much more frequently the post-emotional mental confusion takes the oneiric form. A whole series of varieties are observed between more or less puzzled confusion, ordinary incomplete bewilderment, very incomplete amnesia, with only a few more or less hypnogenic hallucinations, in the reality of which he only hesitatingly believes, and the intensely delirious oneiric patient who lives entirely in a life of dreams, the real outside world not existing for him.

However, in one case as in the other, the hallucinations are dominated, and the delirium directed, almost always by events from the battle-field, assault, carnage, the enemy attack, and, above all,

the scene of horror which originated his troubles. This is not always so, however, and the expression of disturbances from the emotional starting point is not always emotional. For example, with one of our patients a hare embellished his delirium; he had caught it by the ears in the trench the previous night (a night he had really passed in the field hospital). At other times, the war visions, although of a violently emotional character, massacres, shell explosions, are related in an entirely unemotional way. The patients describe the horrors at which they assisted in the same tone of voice they might use for some natural and uninteresting commonplace fact; one might also say they had not the appearance of believing it themselves.

Oneiric delirium, however, necessitates one remark: between the confusional oneiric delirium and the oneiric hallucinations of certain hysterics, a well-defined difference does not always seem to us to exist.¹ The hysterical patient, who does nothing without excess, may present the most beautiful types of total oneiric delirium, when any distinction in the mental confusion can only be a mere question of shade. We are unconvinced that the oneiric delirium of hystérics is not the most frequent and that in the mental domain of war accidents, as in the sensory motor domain, hysteria

¹ Régis himself acknowledges the favourable effects of hypnosis on delirious confusion; now it seems more and more evident that hypnosis is only a means of suggestion; that one may obtain in the waking state all that can be procured during hypnotic sleep, and that results are specially obtainable in the case of hysterical disturbances.

does not play a leading part, which has perhaps been so little recognized that it has led to an unduly widened interpretation of mental confusion.¹

In the following observation, for example, at first sight apparently mental delusion of the intense oneiric delirium type has immediately followed a true commotion. But, on examining the facts with more care, it is evident first that it is impossible to assert there has been a true commotion. Then, between the time the inhibited patient regained any idea of the external world and the hallucinatory delirium in which he seemed to have lived entirely, there is a period, although perhaps a very short one, during which he gave himself up to motor manifestations, evidently of a hysterical nature. This fact, which might very easily have escaped us, fixes the diagnosis and indicates the dangers of a too hasty, or insufficiently tabulated, interpretation.

Isidor, aged 27, admitted into our hospital during the night of the 2nd-3rd December. He seemed more sleepy than anything else, but suddenly sat down on his bed, became agitated, pointed with his finger, cried out, "The Boches are coming," ran to the telephone (he is a telephonist), and gave orders. Then he went to sleep again and only woke to say "drink," "sleep," or to throw himself on the Boches, with a wild air, congested face and haggard eyes. He did not reply to questions, give his name or put out his tongue when told to do so: he had the appearance of neither seeing nor hearing, of being confused, he was mentally absent from his

¹ Chaslin (38), especially, has recorded examples of intense oneiric delirium of purely hysterical origin.

real surroundings, and had the air of living in a dream.

Neither wound nor ecchymosis. No paralysis, reflex disturbance nor sign of any meningeal reaction, no contracture. No temperature. Instable pulse, passing suddenly from 50 to 80. Pupils small, but reacting well. Passed no urine during twenty-four hours.

Two days later, 5th December, he awoke suddenly, asked where he was and how he came there; his surroundings disturbed him, he talked and ate by himself; but stated he remembered nothing of what had happened. Now and again, when asleep, during his dreams he spoke aloud of the war; but, with the exception of having a slightly bewildered appearance, he had become almost normal again.

During the following days he came to himself altogether, related very ponderously that, finding himself on a bicycle at night near V—, on a very congested road, he heard several shells fall near him. He went across the fields to reach the towing path of the canal, 20 metres away, which seemed safer, and he raised his leg to again mount his bicycle; but had no recollection of anything from that moment. He had no signs of genuine dislocalization as to time and space, neither retrograde nor continuous amnesia. He had been wounded previously, and the manner in which he told of his fighting, sedately and without emphasis, showed that he had been very mad.

The orderlies, who brought the patient to our field hospital, filled up the blank in his memory; they stated that he was thrown into the air by an explosion at close range; that he was transported

inert to the clearing station. He had a violent convulsive attack, evidently hysterical, in which he hit out with his feet and fists, cried out and created such a disturbance that it was necessary to bind him in order to bring him to our hospital.

Thus, it seems there was a preliminary phase of probable commotional inertia, a short second phase of motor agitation, clearly of hysterical character, a third phase of oneiric delirium dominating the whole existence: the nature of this oneiric delirium seems to us to be more probably hysterical than confusional.

Certain whiffs of hallucinatory delirium, of a terrifying character, appear to us to have been correctly included in this same group of hysteremotive psychoses by Claude, Dide, and Lejonne (44).

It is conceivable that a soldier may often take refuge in flight, either in a condition of oneiric delirium, to escape imaginary dangers, or in one of simple mental confusion. In the latter case this often resembles epileptic flight; it is a form of ambulatory automatism, often, seemingly, without any great incoherence and without the slightest apparent emotion, although the origin may be emotional; it appears to be followed by complete amnesia.

This flight is very different from that we discussed with regard to emotive neurosis (p. 119). That also followed an emotional shock, but was directed by a pathological fear of very real events.

Other flights may be started by an obsessing idea, or by an animal impulse, often without, or with only

very indirect, relation to the battle scenes. Such are the cases quoted by Devaux and Logre (56), by Mallet (166), etc., . . . of an obsessed patient, suffering from mania of cleanliness, fleeing from the trench because everything was dirty, stank, and he had no power of resistance; of another, who had an attack of madness, and simply felt compelled to go, without knowing why; of a hypochondriac, running away suddenly, "because he was afraid he would go mad, his doctor having ordered him to avoid excitement," etc.

In military, as in civil, life, flight sometimes marks the beginning of dementia, dementia præcox, or particularly of paralytic dementia. The clumsiness and inconsistency of the flight itself, not less than all the other mental or physical characteristics of dementia præcox or of general paralysis, which appear on a detailed examination, soon enable an expert to make a correct diagnosis.

It is understood, of course, that the series of etiological varieties of flight must be exhausted: the flights of epileptics, alcoholics, melancholics, the persecuted, the feeble, etc., are not less frequent in the army than they are in civil life; those of phobic patients and of the constitutionally anxious are much more frequent.

Occasionally certain mental confusions of emotional origin will become chronic, with progressive intellectual and emotional degeneration bordering on genuine post-emotive dementia, the relations of which with other etiological forms of dementia are, as yet, but insufficiently established. Indifference and inertia are usually the main characteristics, the

patient is more conscious of his condition than in ordinary dementia, and its evolution, more or less delayed, is very often retrogressive.

Certain of these chronic conditions, by the addition of some more or less characteristic symptom, take on the semblance of dementia præcox, of hebephrenic or hebephreno-catatonic form. Thus, Guillaïn (89) mentions a soldier who, after a period of catatonic stupor, passed into a delirious condition, with periods of mutism and negativism, persistent catatonia. Dupouy (66) observed a patient who, a year after a commotion from shell explosion, presented a syndrome of dementia præcox, with profound alteration of intelligence and of character, aprosexia, amnesia, emotional and affective indifference, inertia and irritability, stereotyped replies, negativism, catatonia, etc. • J. Lépine (121) saw syndromes of dementia præcox with childishness slowly evolved,¹ but these syndromes were curable in the end.

We ourselves, with Fassou, saw a soldier who came from the region of Verdun, where the battle was at its height. He was in a condition of complete mental confusion, with periods of agitation, with undulating and affected movements, to a certain point stereotyped, with echolalia, negativism; we were, unfortunately, not able to watch him for long. Another, who arrived in a state of depression, with

¹ Cases of post-confusional childishness in soldiers have been reported by Charon and Halberstadt (36), Dupré, Charpentier (37), Bonhomme (26), Laignel-Lavastine (112), etc. In the majority of these cases at least some element of the syndrome of dementia præcox was absent; certain of them appeared to be *en rapport* with hysteria; but in nearly every case the time necessary for proving whether or not dementia præcox must be acknowledged had not elapsed.

the appearance of melancholic stupor, presented cataleptoid attitudes, which he maintained for more than twenty minutes, almost without a tremor, his leg raised or his arm in an opisthotonic attitude. The catalepsy disappeared during the following months, and his intellect seemed to revive, but the subnormal condition was broken by periods of more or less maniacal aspect, with unreasonable explosive laughter and slight mannerisms, or periods of relative lypemaniacal depression. The emotional state remained fairly active, so that we were tempted to conclude, although not without much hesitation, that it was a condition of depressive maniacal psychosis.¹

Leroy (145) has seen several cases of dementia præcox, where the traumatism certainly seemed to be the etiological cause; in one case especially, that of a sergeant, after a mine explosion there was a short phase of mental confusion, then typical dementia præcox, with total emotional indifference, considerable weakness of attention, amnesia, stereotyped speech and writing.

Certainly in a number of these observations, it is a case of pseudo-dementia præcox; the patients present less emotional indifference and more consciousness of their condition than in genuine dementia præcox and generally recover eventually.

But is it not sometimes a case of genuine dementia

¹ Intense pigmentation, especially at the site of an old vesicant, with somewhat weak arterial tension, caused us to think there might be a suprarenal origin, especially as anatomical researches we had formerly carried out in the laboratory of Professor Joffroy had revealed to us an evident relation between certain conditions of psychical depression and large suprarenal lesions. We were not able to watch the patient long enough to obtain a definite diagnosis.

præcox ? In this last hypothesis, would this condition occur as the result of a commotion or an emotion, by simple coincidence, as one might be greatly tempted to believe on comparing the present frequency of commotional and emotional conditions and the rarity of subsequent demential conditions ? Is not physical or moral traumatism capable of precipitating the evolution of a potential dementia præcox, even in patients who present no hereditary antecedents, like that of Leroy ? Or again, is not a commotion, such as that caused by the deflagration of large masses of explosives, capable, in itself, of producing irremediable lesions of the cerebral cells and of creating in all respects the lesions of dementia præcox ? We can only raise the terms of the problem, without having, so far, the slightest plausible motive for inclining towards any particular solution : at the present time we are too ignorant of what genuine dementia præcox is.

Certain post-commotional or emotional demential conditions take on the aspect of paralytic dementia after a period of inertia or confusion. But it is then a case of pseudo-general paralysis of the insane ; the dementia is generally less, the patient is more conscious of his state, there seems to be numbness rather than definite loss of the faculties, the mental torpor being more in touch with the considerable physical asthenia. In fact, the reawakening of the mental functions is often more or less contemporaneous with that of the physical vigour, although sometimes this only occurs after several months. Further, the emotive state and delirious ideas are nearly uniformly of a depressive character. Finally,

and above all, one observes neither the characteristic disturbances of speech of G.P.I., the Argyll-Robertson sign, nor cephalo-spinal lymphocytosis.¹

But if the commotion or the emotion does not appear to be capable of creating authentic general paralysis, is it incapable of inducing in a syphilitic the development of true general paralysis, which perhaps would not have supervened without the events of war? It is difficult to reply definitely to this question, on which opinions are still much divided.² For our part, we consider that the number of paralytics we have observed during the course of this war is very limited; here we are in agreement with a number of neurologists and psychiatrists. Further, it seems to us that if the events of war can play a provocative or important localizing part in the genesis of this disease, this is only applicable to an extremely small number of cases.

Mignot (181), on the other hand, has emphasized the accelerating part that war has played on the evolution of pronounced general paralysis. The G.P.I. of war, specially of combatant officers, who are more exposed to mental and moral, if not physical, strain, would be a general paralysis "which would pass through a halting-place without stopping." We are much inclined to regard this opinion as justified in a general way; but we have no exact docu-

¹ A case recently reported by Pitres and Marchand (194) is not an exception: these differential characteristics of pseudo-general paralysis are found in it. Jean Lépine (121) states he has seen the complete physical signs of general paralysis after commotions; the patients have recovered slowly but completely.

² See the discussions on this subject at the Society of Neurology, December 1916, and at the Clinical Society of Mental Medicine, July 1917.

ments which enable us to determine the accelerating rôle not only of worries and anxieties of a general order, but also of the direct, physical or moral traumatism caused by commotion or emotion.

Attacks of mania and of melancholia do not appear to have become appreciably more frequent owing to the events of war; commotions and emotions are often only the occasion of a fit to which previous attacks had shown an evident predisposition; as in all the varieties of psychopathic states following the events of the battlefield, the basis of the delirious ideas is nearly always a battle theme.

The same remarks apply to certain varieties of delirium or pseudo-delirium of persecution, which are often curable.

CHAPTER VIII

HYSTERICAL TROUBLES FOLLOWING EMOTIONS

HYSTERICAL manifestations have been studied with the greatest care and competence by Babinski and Froment in one of the volumes of this series (11); they constitute a great part of the *Psychoneuroses of War*, so well described by Roussy and Lhermitte in another of these manuals (213), and we shall not, therefore, encroach on their descriptions.

Moreover, it would be a mistake to believe that these hysterical manifestations form an integral and necessary part of the syndrome of emotion; too many authors have a tendency to confuse and to liken emotional and hysterical troubles. "Violent emotions pave the way and predispose to hysterical symptoms; . . . by weakening the critical sense, they may increase suggestibility" (Babinski):¹ that is why hysterical symptoms have been frequently observed during the course of the war as after-effects of emotions. But they may develop apart from any emotion; and, on the other hand, are only an accessory and an addition to the physio-psycho-

¹ If a powerful argument were necessary to prove that emotion alone does not give rise to hysterical manifestations, war would furnish it. Indeed, hysterical disturbances are never observed unless the patient is in at any rate relative security: a hysterical attack has never been seen in the midst of barrage fire!

logical picture of emotive shock, or to the emotive neurosis we are going to describe: doubtless often a noisy accessory and apparently primordial, but only apparently. Emotion and emotive neurosis, as a matter of fact, have nothing in common with hysteria; hysterical symptoms are only a more or less subconscious embellishment.

It is by the intervention of at least retrospective emotion that commotional patients present hysterical troubles, but much less than simple emotional patients.

Hysterical war manifestations are identical with those during the time of peace; only they are observed much more often in man and certain of them are of particularly frequent occurrence.

Thus, the two great manifestations of the field of battle are convulsive attacks and mutism or deaf-mutism: again these manifestations are extremely variable in number, according to certain conditions which, in the army, may or may not exercise a more or less contra-suggestive influence. For example, in the army of which we direct the Neurological Centre, we have had the satisfaction of seeing the number of nervous attacks diminish considerably since the report was spread, by soldiers who went back to their company without being sent on leave, that with us "attacks had not a good reputation and were disapproved of!" As regards mutism and deaf-mutism, we have seen these become genuine little epidemics in certain armies, whereas in others they were almost unknown.¹

¹ Side by side with mutism, there is a whole series of disturbances of speech, and care must be taken not to consider or treat them as

Functional paralyses are much more rare; in contradistinction to what is seen in civil life, they are presented especially in the paraplegic or monoplegic form, and are rarely of the hemiplegic type. Indeed, it is hemiplegia that the patient imitates in civil life specially, and paraplegia or monoplegia in military life. Algias¹ and anæsthesias, contractures, lameness,¹ tremors and twistings are observed with varying frequency.

Almost all hysterical troubles, when treated at an early date, are easy to cure by psychotherapy: this is why in the neurological centres of the army, which are essentially barrage centres, no single case must be allowed to filter through into the inland zone. But to do this, one must never forget that either auto- or hetero-suggestion provokes hysterical manifestations, and that it is only by counter suggestion that these can be cured. The therapeutic treatment will only succeed if the conditions of the examination and the personnel exercise no opposing action; a word, a wrong gesture may have the

dissimilar affections, as certain authors have done. Mutism, pseudo-stammering, spluttering, stumbling, scansion, aphonia, or dysphonia, "nigger talk," etc., are only varieties of the same neuropathic disturbance. We have seen them succeed each other sometimes in the same patient who, imbued with the ideas of re-education of speech so largely brought before the public, did not believe he could be cured immediately and without varying his efforts!

¹ All the forms of lameness or of hysterical astasia-abasia, saltatorian and salutatorian movements, zigzag walking, scissor walking, etc., are nothing but varieties of the same neuropathic trouble. The classifications which have been made have a purely descriptive interest; but the variations certainly would not be admitted, if it was desired to deduce that they required differences in treatment.

most regrettable effect on the rapidity and certainty of cure.

This therapeutic treatment is the indispensable complement of diagnosis; every algia, paraplegia, contracture, or hysterical twisting ought to be cured immediately or very rapidly by suggestion; every hysterical attack should be induced by suggestion and this provocation should be the immediate starting-point of an efficacious counter-suggestion.

Nevertheless, certain post-emotional hysterical troubles seem to be refractory to psychotherapy, even when well conducted. These are specially the disturbances which are observed in the hospital in the interior and which, as a general rule, have not developed directly after the emotive shock, but progressively, after evacuation to the inland zone. It may be that perhaps less of the emotive shock has entered into their pathogenesis than a deplorable double suggestive action, for example, on the one hand the hospital card (where the term commotion is too often unduly employed) seems to imply some grave lesion, probably incurable; on the other, the inland centre, where noxious influences, although well intentioned, of comrades, warders, politicians, or journalists make themselves felt, often quite involuntarily, without any adequate counterpoise.

Another factor of prolongation is observed inland; it is what, by analogy with the facts observed before the war in industrial accidents, may be called the psychosis of reclamation, *sinistrosis*, according to Brissaud's term. From our point of view, it is altogether wrong that the term *sinistrosis* of war should be applied to all hysterical post-emotional

accidents. Sinistrosis is a genuine disease in itself, a mental one, quite distinct from hysteria, in the same way as neurasthenia or emotive neurosis.

Sinistrosis rarely occurs as an after-effect of pure emotion, it nearly always exists at the same time as an insignificant 'wound or some slight' organic spontaneous lesion. In any case, it is not born of emotion; but of remembrance when emotion no longer exists; it is born of the idea of 'discharge from the service, with its double benefit, removal from danger and pecuniary indemnity. This idea is vague at first, then fixed and finally obsessing.

It may not be a question of pure simulation; perhaps the sinistrosis borders on to simulation, at certain moments at least; but in its coldly resisting attitude there is an element of good faith. With at least relative good faith, it perseveres, because it really attributes to a minute lesion an importance it has not got; in good faith, the patient continues to suffer from an infinitely slight wound, or limps because he believes he must either suffer or limp. By a sort of vicious circle, he becomes more and more convinced of the duration and gravity of the lesion, the longer it continues to bother him.

Strong in his right, fortified often by an imprudent hospital admission card, or some support indiscreetly promised, the patient will defy one and all, especially the doctor or any attempt at persuasion on his part. It is a genuine systematized delusion, an obsessed hypochondriasis, and the patient often becomes emaciated, losing sleep and appetite, "attentive to the slightest discomfort, the smallest suffering, suggesting to himself at will, and attributing everything to the traumatism" (214).

Another case of resistance must, it is true, be attributed sometimes to the doctor himself. Thus, it is not unusual that the neuropathic element of a hystero-organic association should pass unnoticed, or above all that troubles with an organic starting point should persist unduly after the lesions have recovered, owing to the fact that a neurosis has been added later and has remained unrecognized. Thus, from the beginning of the war, we have seen several patients completely paraplegic for many months, as the after-effect of a so-called commotion or medullary contusion (125). In reality the traumatism certainly existed and at first the troubles were due to authentic lesions; but these were rapidly curable and the paraplegia only subsisted owing to neuropathic perseverance, by an acquired habit; as it were, for habit is a powerful source of suggestion. This paraplegia was cured after psychotherapeutic treatment to the great delight of the patients, which they did not hide.

The contrary takes place in cases which are perhaps more frequent: the hysterical patient is not taken for an organic one, it is the organic patient who is considered to be hysterical; should he prove refractory, it must now be recognized that it is too often because he has real lesions which prevent his recovery. "By the side of the objective signs with which we are acquainted, there are others still unknown, the discovery of which will one day lead us to remove from the group of functional conditions states, which are now regarded as such." In this respect, war will have taught us much, and will have served to teach the doctor a lesson in modesty.

In this way, since the beginning of the campaign,

we have learned to separate from hysterical or pithiatic troubles a whole series of paralyses, and of reflex or physiopathic contractures [Babinski and Froment (11)]. The discovery of blood in the cerebro-spinal fluid enables us to group amongst organic paralyses certain paraplegias which, without that, would doubtless have been considered as hysterical (Ravaut (197, 198), Guillain (85, 96, etc.), Souques (223), etc.) Thus, certain contractures formerly reputed hysterical appear to-day to be due to the existence in the muscle of simple metallic powder or to a foreign body which has escaped radiography (139). Others depend on the partial irritation of a nerve at a distance, on the secondary retraction of the antagonists of certain paralysed muscles, on the secondary contracture of the paralysed muscles themselves, etc.; so that we now observe hardly any persistent contracture, which has not been tested as an organic determination. Numerous algias or paralyses of the limbs, more or less stripped of known objective signs, are the consequence of nerve irritation near their roots or their plexus of origin (rheumatism (136), tuberculosis (142), etc.). Certain hemianæsthesias regarded as hysterical are, in fact, symptomatic of a thalamic lesion, although nearly complete or pure (134).*

By the side of post-emotional hysterical tremors, generally atypical and polymorphic, are others, often more regular or rhythmic, simulating Parkinson's disease or sclerosis in patches, which appear to be due to an organic lesion,¹ probably of the grey

¹ Babinski and Dubois (10) have reported a case of tremor, the effect of a commotion from the bursting of a shell, limited to the right arm and accompanied by muscular hypertrophy of the affected limb.

central nuclei; they may be the after-effects of a commotion [Guillain (88)], and may also succeed a simple vivid emotion. Their diagnosis rests sometimes on symptomatic gradations, indeed, even exclusively on their prolongation and resistance to treatment [H. Meige (177, 178)]. We have said that certain post-emotional tremors seem progressively or rapidly to border on to confirmed Basedow's disease.

The vertebral twists (camptocormias, camptospinal, etc.), frequently shown during this war, seem sometimes purely neuropathic in origin [Souques (324)] and recover well under suggestion. At other times, they have an organic starting-point in a forced flexion, a twist of the vertebral column [Sicard (220)], and are maintained by the preservation of an antalgic attitude, which becomes purely neuropathic. Finally, in a number of cases, we have been able to prove the existence on the plane of the lumbar column of evident lesions of chronic rheumatism, of lumbarthrititis, which had previously remained unrecognized (137).

We have purposely insisted somewhat on this renovation of pathology that war has brought about. Unfortunately prolonged experience of the neurology of war has caused us to think that perhaps there is too great a tendency to see refractory and recalcitrant functions where, really, there are sometimes sinistroses of war, that are often organic but unrecognized. Frequent as we believe hysteria to be, and simple and rapidly efficacious as is its treatment; infrequent as we consider the so-called indefinitely refractory hysterias, which although well treated, retain for months or years the same

fixed attitude, or the same tremor, etc., we are more and more persuaded that in the majority of these patients, one day or another the chance discovery of some sign, either ignored or but little known so far, will give proof of their organic lesions.

CHAPTER IX

ORGANIC FOCAL LESIONS DUE TO COMMOTIONS

As we have already stated, the production of important internal hæmorrhages and focal lesions, after the simple bursting of a large projectile at close range, has been one of the medical revelations of this war. The hæmorrhages occur specially in the central nervous system. Various allusions to such cases had been made previously, but had lacked precision.

Observations of this kind reported up to the present, have been so few and far between that we consider it advisable to give a rapid general review, which will enable us to visualize them as a whole.

Leclercq (118), on 11th January 1915, published the case of a soldier who had an ordinary 77 shell fall so close to him that his face was covered with grains of powder ; he arrived in a condition of shock and died twenty-four hours later. There was slight hæmorrhage of the intestine, mesentery, and omentum, Tardieu's spots extending over the lung and pericardium, and especially a rupture of the tunica interna of the aorta at the junction of the abdominal and thoracic portions.

Sencert (219), on 13th January 1915, reported the case of a patient in front of whom a large calibre shell had exploded at the distance of one metre ;

he lost consciousness and was brought in ten hours later in a state of shock. There was no external wound. He was seized with hæmatemesis and died the following night. The stomach was ecchymotic; both lungs badly torn, as if they had burst after the sudden entry of air under enormous pressure, the pleura full of blood.

Ravaut, Guillain, Heitz, Souques, we ourselves, and a number of authors later published a series of observations, in which hæmorrhage had taken place in the nervous centres, caused by shell explosion without any external wound. Amongst the cases in which the facts are actually known, there are more medullary than cerebral lesions. This is not because the former are more frequent, but rather because a number of them allowed of a relatively prolonged survival, which at any rate permitted the victims to reach the field hospital, where a detailed examination was possible.

(A) MEDULLARY LESIONS

Focal medullary lesions from commotion are nearly always translated into paraplegias, although exceptionally there is a Brown-Séquard syndrome or a quadriplegia.

On 8th April 1915, Ravaut (196) reported a case of complete paraplegia, with anæsthesia extending up to the umbilicus and retention of urine; these symptoms had resulted from the explosion of a shell a short distance away; the patient, stunned, but not unconscious, was unable to raise himself. He had no mark of either wound or contusion. The

bladder contained a markedly hæmorrhagic fluid; under strong pressure lumbar puncture yielded a blood-stained fluid. This patient's case could not be followed up.

On 17th April 1915, Guillain (85) reported two cases of clearly organic paraplegia, without external wound, the immediate result of shell explosions. In one, the paraplegia was complete for several days, then the paralysis became localized in the right leg, and finally only in the muscles of the posterior region of the thigh, where it still persisted in a palliated form at the end of four months. The patellar reflexes were very exaggerated, spinal trepidation present, plantar reflex abolished. In the other case, the paraplegia was flaccid and complete, but without sphincter disturbances, modification of the reflexes or of the cerebro-spinal fluid. Although this paralysis at first had the appearance of being purely functional, diffuse amyotrophia of the lower limbs developed, with exaggeration of the patellar reflexes and spinal trepidation, which proved an organic origin.

Heitz, on 22nd May 1915 (101), cited five cases of organic paraplegia without exterior wound following shell explosions.

In the first case, the paraplegia was almost total; anæsthesia reached up to the groins, but was partially dissociated, although complete everywhere for pricks and changes of temperature, it was only complete for contact in the region of the sacral roots; slight disturbances of micturition after transitory retention; patellar reflexes retained (Achilles not taken into consideration) abolition of plantar reflexes, spinal neuralgia. Progressive

improvement, but this was still very incomplete at the end of five months.

In the second case, the paraplegia was also absolute; very extensive anæsthesia, specially marked in the region of dorsal vertebrae ¹⁰⁻¹¹⁻¹² and of lumbar ¹, dissociated to a great extent, of syringomyelic type; patellar and plantar reflexes abolished; hardly any sphincteric disturbances; spinal neuralgia and pains in legs; previous pulmonary congestion and eschars. Recovery still incomplete at end of five months.

In the third case, the paraplegia, although absolute at first, diminished at the end of a few days; anæsthesia total in the three ways, but limited to the zone of the sacral roots; the reflexes preserved (no question of Achilles); slight symptoms of urinary retention; spinal neuralgia. Recovery still very incomplete at end of four and a half months.

Fourth case: paraplegia almost complete, more pronounced on the left; left patellar reflex abolished, right very weak; anæsthesia of pure syringomyelic type in the domain of the sacral roots and of lumbar ³⁻⁴⁻⁵; severe sphincterian troubles, retention, then incontinence; no spinal neuralgia. Death at end of a month from pulmonary complications and eschars.

Fifth case: absolute paraplegia; all reflexes abolished; total anæsthesia in the three ways in the region of the sacral roots and of lumbar ⁴⁻⁵, dissociated of syringomyelic type on dorsal ¹¹⁻¹² and lumbar ¹⁻²⁻³; severe sphincterian troubles of retention, then of incontinence; spinal neuralgia. Eschar, pulmonary complications, death on the tenth day.

In these five cases, the paraplegia appeared at the exact moment of the shell explosion near by. Neither lumbar puncture nor post-mortem was made in any of them. The intensity of the paraplegic phenomena, the dissociation of sensibility of a more or less clear syringomyelic type in all the observations seem, in all probability, to indicate hæmatomyelia.¹

On 29th July 1915, Pierre Marie and Chatelin (169) communicated their observations in the case of a soldier who had a large calibre shell explode a few metres away from him; he had flaccid complete paraplegia of the left leg, with abolition of all the reflexes on that side, thermic hypoesthesia very accentuated in the region of the sacral roots and of lumbar ⁴⁻⁵ on the right, coldness of the limb and abundant sudoral hypersecretion in the same region. What is remarkable is this case in that, although to all appearance a hæmatomyelia, the symptoms did not supervene immediately; for nearly two hours the patient continued marching, with increased fatigue and a sensation of extreme heaviness in the right leg; when he arrived at camp, he fell asleep and the following morning at réveillé, when he tried to get up, he found it was quite impossible to use his right leg.

At the same meeting Fromont (76) reported the

¹ Heitz adds to these cases a recent observation of Elliot (73), in which, after shell explosion, a soldier had paraplegia and died rapidly with signs of internal hæmorrhage. In two other cases noted by this same author, transitory paraplegia occurred in analogous circumstances and was probably of organic origin. These different patients had been either buried alive, or had at least, it appears, had a violent shock on the back.

case of a soldier, who was 30 centimetres from a shell when it burst; he was able to walk with assistance for a quarter of an hour, then paraplegia appeared, at first complete, with total anæsthesia, but with slight modification of the reflexes (patellar and cutaneous strong, Achilles rather weak) and without sphincterian troubles. On examination at the end of forty-eight hours, the cerebro-spinal fluid was found to be clear, containing a fairly large number of hæmatia and a slight excess of albumin. During the following weeks and months, the paraplegia and anæsthesia became confined to the feet, especially the left foot. This soldier, seen again six months later, had no further paraplegia, beyond very mild sequellæ, moderate thermo-anæsthesia of the right foot, exaggeration of the left patellar reflex, slight atrophy and muscular hypoexcitability of the left leg, spinal neuralgia with sciatic radiations. He might perhaps have been regarded as suffering from simple functional disturbances, if knowledge of his antecedents had not proved the organic origin.

The same day (15) Ballet quoted the case of a soldier who, after a shell had burst near him, developed incomplete paralysis of the right leg, with exaggeration of the right reflexes and clonus of the foot, without Babinski's sign, and anæsthesia with syringomyelic dissociation of the left leg, no sphincterian symptoms; finally, Brown-Séquard syndrome, due very probably to hæmatomyelia.

Joubert reported, 23rd October 1915 (107), an observation of complete flaccid paralysis with abolition of the reflexes, absolute anæsthesia and retention of the sphincters, occurring immediately after

the explosion of a large calibre shell and terminating fatally on the 17th day, owing to eschars and uræmic disturbances. Lumbar puncture, performed on the 4th day after the accident, yielded a clearly hæmorrhagic fluid.

On 29th October 1915, Sôuques (223) published a summary of observations of several soldiers who, after shell explosions without wounds exhibited more or less persistent paralysis; certain of the observations (IV., VI., IX.), although studied somewhat late, appeared to be paraplegias from shell explosion; other observations (V., VII.) are perhaps quadriplegias from the spinal cord having been affected.

On 26th May 1916, Guillaïn and Barré (93) recorded the history of a soldier who, as the result of an explosion of a minnenwerfer bomb, in addition to headache, had asthenia, vertigo, brachycardia, epileptoid trepidation of the feet and a bilateral reflex of the toes in extension.

We ourselves have observed several cases of paraplegia, undoubtedly organic, occurring immediately after the explosion of shells in close proximity, without wound or contusion of any kind. One of them, interesting because of the restricted localization, was recorded by us on 29th June 1916 (129). Without loss of consciousness the patient developed total paraplegia, which localized itself rapidly and severely in both feet (feet and toes left, toes only right): preservation of all tendon and cutaneous reflexes, which are fairly strong, with the exception of the Achilles, and cutaneous plantar reflexes, which are abolished. Total superficial and deep anæsthesia (contact, pain, temperature, notion of

position, vibratory sensibility), of the foot and lower quarter of the left leg, of the sole and front part of the back of the right foot ; no sphincterian or genital trouble at any time ; later important trophic disturbances of the left heel, eschar and large phlegmona of the lower part of the leg, which was almost completely anæsthetic (these last symptoms had not materialized when the observation was published). The cerebro-spinal fluid, examined first by Dr Mallet, revealed nothing abnormal then ; examined by us later, we detected clear lymphocytosis. This symptomatology enables us to localize the lesion as on a level with the medullary epicone, that is to say on a level with the medullary segments, lumbar ⁵, Sacral ¹⁻² (more closely even by sensory disturbances on a level with the lower part of the epicone Sacral ¹⁻²), zone responding to the depth of the first lumbar vertebra.

If we summarize the whole of these observations, taking the clinical point of view strictly, and neglecting for the moment all discussion on etiology or pathology, we see that most frequently the organic nature of the paraplegia has been proved by the clinical examination alone.

On several occasions a lumbar puncture has been made and has yielded either a normal fluid (Guillain), or an abnormal one (personal case), but not blood-stained. Of course it must not be inferred necessarily that there is no question of hæmorrhage, for the puncture might have been made after the absorption of the blood, or the hæmorrhage might have remained intra-medullary and not have touched the meninges. In some cases, indeed, the whole

of the symptomatology, violence of the disturbances, dissociation of sensibility of more or less pure syringomyelic type, etc., rendered hæmatomyelia almost certain (cases of Heitz, Pierre Marie and Chatelin, of Ballet, André Léri, etc.).

Finally, in some rare observations, lumbar puncture yielded a blood-stained fluid (cases of Ravaut, Joubert, fluid histologically blood-stained in Froment's patient). Ordinarily this only confirmed the organic origin of the troubles by proving the vascular starting point; with Ravaut's patient, on the other hand, it appears that the blood test gave rise to the idea of the organic origin of the symptoms presented, but we are not well enough acquainted with the details of this observation to know whether there were other clearly organic signs.

In all the cases there was a fall, except in Froment's, where the soldier was lying down, in that of Pierre Marie and Chatelin, where the patient continued marching, and perhaps in one of Souques' (Observation V.). These last cases were apparently the only ones where the paraplegia was not immediate; the hæmorrhagic origin does not seem less probable from the clinical examination. We ourselves have observed a case in which the paraplegic disturbances were not immediate, were evolved progressively, and even followed by delayed cerebral symptoms. In the greater number of the observations, the accident was not accompanied by loss of consciousness (Ravaut's cases, Nos. I., IV., and V., of Heitz, cases of Froment, Ballet, Joubert, Souques, A. Léri).

(B) CEREBRAL LESIONS

Focal cerebral lesions, caused by shells bursting a short distance away, have not, up to the present, been reported by a very large number of authors.

The majority are manifested clinically by hemiplegias of organic character.

On 3rd May 1915, Guillain (86) recorded the history of a patient who, after the explosion of a large calibre shell in his trench, lost consciousness and, on coming to himself, complained of headache and generalized pains. Right hemiparesis with spinal trepidation and Babinski sign diagnosed, and generalized contracture of the body occurred if movements were made, with very marked Kernig's sign. The cerebro-spinal fluid contained hæmatia and numerous lymphocytes.

In August 1915, the same author (92) quoted the observation of a soldier, who was thrown down one night by a shell falling close to him; he lost consciousness; the following morning he complained of headache and spinal neuralgia. He had a convulsive attack, and complete left hemiplegia was diagnosed, with tendency to contracture, exaggeration of the patellar reflexes and those of the left arm, clonus of foot and patella, Babinski sign, left lateral dysæsthesia (painful sensations, badly interpreted and badly localized, loss of sensations of heat and cold, of the sense of position and of stereognostic perception), slight dysarthria. The cerebro-spinal fluid was clear, hypertension, no hyperalbuminuria, very slight lymphocytosis.

In October 1916, the same author published

another observation with Barré (95) of clearly organic right hemiplegia, with exaggeration of the tendon reflexes of the right leg and plantar reflex in extension of that side. This hemiplegia had appeared, without loss of consciousness, directly after the explosion of a torpedo in close proximity; it was, however, slight and the patient improved rapidly. The cerebro-spinal fluid was clear, without hypertension, slightly hyper-albuminous, but without lymphocytosis.

On 26th August, 1915 (198), Ravaut reported the case of a soldier, who had had a hand bomb explode a metre away from him; he was thrown down, covered with earth, and badly stunned. He got up painfully and it was found he had total left hemiplegia of face and limbs, with hemianæsthesia of the same side and visual and auditory troubles, weak reflexes, no Babinski sign; progressive improvement. The cerebro-spinal fluid only showed an increased proportion of albumin. Four months later, Laignel-Lavastine was said to find signs of hæmatomyelia in this patient; left spinal hemiparesis with crural predominance, and syringomyelic dissociation of the sensibility of radicular disposition, with atrophy of the femoral quadriceps and diminution of the reflexes on the left side.

Souques, Mégevand, and Donnet (223) observed two soldiers attacked in analogous conditions by the windage of the explosive. With one of them there was hemiparesis with Babinski sign, abolition of the abdominal and cremaster reflexes and cerebro-spinal lymphocytosis; the hemiparesis and lymphocytosis were transitory, however. With the other patient, right transitory hemiplegia developed with

persistent aphasia; the cerebro-spinal fluid was normal when examined a year later.

In the case of an adjutant suffering from shell commotion, Sollier and Chartier (221) are stated to have found a right hemiplegia with anarthria of a clearly organic character, but they give no details.

Henri Français (75) reported a case of organic hemiplegia, with momentary loss of consciousness, developing progressively in the twelve hours following a shell explosion a very little distance away.

Pierre Marie and Mlle Lévy (172) saw a case of right organic hemiplegia, which developed without any wound after a torpedo explosion; immediate and prolonged loss of consciousness, transitory aphasia.

Bâbonneix and David (13) also recently published an observation of left incomplete hemiplegia occurring as the result of a shell explosion; but there was also a wound at the right side of the neck, which might call for some discussion, although, as a matter of fact, it does not seem to have had anything to do with the paralysis.

We ourselves have recorded one observation (127) which interested us as much from its etiological purity as from the starting-point of the cerebral lesions.

Jacques, aged 20, heard a big shell coming and threw himself on the ground; the shell burst 2 to 3 metres to his left; he was not thrown down and had no shock or contusion of any kind nor loss of consciousness. It is to be observed that he got up again immediately, stunned, with pain at the right side of his head. He went down into the

trench for ten minutes, then came out again to go and play football 200 metres away. He played for half an hour, his head aching meanwhile; when playing he noticed that his stick often fell out of his left hand, because he no longer felt it; he stumbled and fell several times because he no longer knew the position in which his left leg was. At the end of the game he went into the trench to lie down for ten minutes; on wishing to get up again, he fell, the left side entirely paralysed, and almost at once became completely unconscious. He was taken to our friend Doctor Mallet, who diagnosed total left hemiplegia with very pronounced tendency to diffuse contracture; lumbar puncture yielded a strongly blood-stained fluid.

Examined by us three weeks later he presented almost complete and total spasmodic left hemiplegia (face and limbs); all the tendon reflexes on the left were very exaggerated; the cutaneous, cremaster and abdominal reflexes on the same side were abolished; the sign of the fore-arm was negative; the plantar reflex made a clear extension. Further, there was already notable atrophy of the whole of the left muscular system. Finally, superficial and deep sensibility of all kinds was abolished on the left, with the exception of pain; he suffered violent pain, but without any idea either of what was causing it or where it came from—in short, it was a type of cerebral hemianæsthesia, specially remarkable for its clearness, its persistence, and for the perfect condition of the intellect, which enabled the patient to very accurately appreciate all his sensations.

This symptomatology can only be explained by a primitive hæmorrhage of the right optical layer,

propagated, on the one hand, by the internal capsule, on the other by the ventricles.

This observation was interesting to us in many ways.

On the one hand, it enabled the primitive lesion to be localized in the depth of the brain, namely, in the optical layer, from the beginning of the troubles by a hemianæsthesia of cerebral type, total at the onset (upper and lower limbs).

On the other hand, as far as we know, it is the only case with two of Guillain's (95), and one we shall report below, where the cerebral focal lesion has been produced without loss of consciousness. We can state, an exceptional fact in the circumstances of war, that our patient had neither loss of consciousness, fall, nor shock of any kind—in fact, none of those little apparently accessory traumatisms which one cannot help having a tendency to incriminate, especially when they have been caused by the force of a shell explosion.¹ Thus, the lesion was exclusively consecutive to a shell commotion; it is rigorously and indisputably demonstrative of similar internal cerebral wounds.

Finally, with our patient, blood was found in the cerebro-spinal fluid; apart from meningeal hæmorrhage this is a fairly rare occurrence in cerebral lesions from shell commotion. Guillain only found hæmatia and numerous lymphocytes in one case and a few lymphocytes in another; Souques,

¹ These facts are specially disturbing when one reads observations like that of Porot (195), in which a simple fall backwards, without either projection or displacement, caused a large hæmatomyelia in the young patient, without any sanguinary or vascular predisposition.

Mégevand and Donnet once noted transitory lymphocytosis, and Ravaut once noted albuminosis.

Aphasia has been associated with hemiplegia in the patients of Souques (Obs. III.) and of Pierre Marie and Mlle Lévy; in the second case the aphasia disappeared quickly; in the first the hemiplegia retrogressed and the aphasia persisted.

Out of 142 cases of so-called commotional troubles from explosion in the proximity, Claude (43) only once observed a cerebral focal lesion (probably hæmorrhage); the patient, a young cadet of 20, besides a tympanic lesion with hæmorrhage, had motor aphasia, which recovered fairly rapidly, leaving only a slight dysarthria behind.

Davidenk (52) called attention to the dysarthria of organic origin, accompanied by other signs of organic lesion, which he sometimes saw supervene after a shell explosion.

Pierre Marie and Foix (170) have thrice seen different varieties of aphasia succeed shell explosions, without external wound, but these authors observe cautiously that a doubt remains as to the purely commotional origin of these symptoms, if only from the fact of loss of consciousness and the fall.

We have been able to obtain an observation which, in this respect, is not open to discussion (131):

Kleber, officer, aged 45, was reconnoitring in a trench, accompanied by two officers, when two shells exploded simultaneously on the parapet, one on the right, the other on the left. He fell down on his left arm, but got up again at once; he said his head never touched the ground, and the statements of the accompanying officers confirm his assertion.

He was supported under the arms and taken to the commandant's quarters, situated 30 metres away. At no single moment did he lose consciousness, his limbs were never paralysed, but from the moment of the accident he lost all power of pronouncing a word.

He remained at the commandant's quarters the next day, quite clear mentally, followed the attack through his field glasses in the morning, and in the evening went on foot to the neighbouring clearing station; on the way he showed his orderly the position of the previous day's occurrence and explained it to him by gestures. He only consented to be evacuated forty-eight hours after the shell explosion; he was at once sent to us.

On arrival he was found to have neither wound, scratch, nor ecchymosis. Mental lucidity apparently perfect, and he made use of the most expressive mimicry to indicate his wishes. But he did not speak a single word; his appearance and history *a priori* indicated one diagnosis alone, namely, hysterical mutism. It was therefore very surprising to find it was without doubt a case of true motor aphonia.

The patient apparently understood all that was said to, and all that was asked of, him; his replies, by gestures, were always correct and remarkably precise.

He read admirably, either the paper or his letters, and understood what he read; he recognized the time, numbers and drawings; he read and interpreted the cards of the staff; he did not, however, understand vertical writing, and got puzzled in making out emblems (different flags, although tricolour).

But he was incapable of pronouncing a word or

correct syllable, whether spontaneously, by repetition or in reading. It was found, however, that, in a general way, he knew the names of the objects, but could not pronounce them. He could not sing any of the current airs, although he recognized them.

He was equally incapable of writing either his name, a word, a syllable or letter of any kind, spontaneously, under dictation or after reading. He just succeeded in copying either his name or the name of the town; but he copied servilely, as if it were a drawing, letter by letter, with the voluntarily interpolated mistakes, without transposition of the running hand into printed characters, making them larger or smaller, joining or separating the letters as they were in the copy, and writing just below the model (he himself hid the succeeding letters and forgot those he uncovered too soon).

He could not write any better if he used separate letters, but he copied his name, letter by letter, without transposition and confused similar letters (V for U, M reversed (Σ) for E). In the same way he could not write a number, draw a square, or colour a flag unless he copied it servilely, point by point.

Thus there were almost absolute anartaria and agraphia, with apparently almost perfect comprehension of speech and mental reading.

At first sight the intellect seemed to be well preserved, mainly on account of his apparently rich mimicry; but it was soon seen that this expressive mimicry was on the whole very little varied; further, his affectivity and emotivity were manifestly overstrained, and, in his exaltation, he showed a certain degree of childishness.

At first sight his memory appeared to be excellent, for it existed for everything concerning his present life, whether military or personal; he remembered his officers, their names, knew who has been killed or wounded, remembered what his wife wrote to him, etc. But it was soon found there were large lacunæ in his memory; he was doubtful as to the day, date and month, and, further, as to the Department in which he lived; he could only do a very simple mental addition and no subtraction at all; he got puzzled in counting his own fingers; he could only with difficulty be made to distinguish multiplication from addition or the juxtaposition of numbers; he no longer knew either the alphabet or the sequence of vowels or figures, nor the number of letters or syllables of a word; he had no longer any idea how to play dominoes, cards, etc. "

He executed very simple orders, whether verbal or written, but hesitated a great deal about slightly difficult ones, and was altogether incapable of executing complex orders, such as the test of three papers, or the door and chair test, unless he did them piece by piece, and himself looked at the written order after carrying out each part: it was primarily a case of immediate forgetfulness. As a whole, therefore, his memory was profoundly deficient.

From a physical point of view, no motor, sensory, reflex or trophic disturbance was found. But before our eyes he had a typical attack of Jacksonian epilepsy, localized in the shoulder and right arm, and accompanied by a serious subsyncopal condition.

Neither antecedent nor specific stigmata. Cerebrospinal fluid, examined on the fourth day, clear, "with very few lymphocytes.

No very marked modifications during a month's observation.

This observation appeared remarkable to us, as much from the symptomatic point of view as from the etiological.

Clinically, anarthria and agraphia were found associated in it, thus constituting a very exceptional type of what was formerly called motor aphasia; no obvious disturbances of comprehension of language or of mental reading (verbal deafness and blindness), but there was the special deficiency of intellect and memory so wisely described by Pierre Marie. It was undoubtedly an organic lesion, at first sight simulating hysterical mutism. The typical attack of Jacksonian epilepsy, localized in the right arm, at which we were present, should have been a supplementary confirmation of the organic nature of the troubles.

Etiologically, from the assertions of the patient himself and of several witnesses, it may be pointed out that there was neither loss of consciousness, fall on the head, nor shock of any kind, and that the lesion was due only to the commotion from the shell explosion in the immediate vicinity.

Meningeal hæmorrhage has been reported by Ravaut (197), Guillain, Pitres and Marchand (194), etc. Guillain (96) has recorded an interesting observation of one patient whose focus of meningeal hæmorrhage, following a commotion, became infected by pneumococci and who died at the end of a few days from purulent meningitis.

All the preceding hæmorrhagic lesions seem to have been more or less immediately consecutive to

the explosion of a projectile; in certain cases delayed lesions have been diagnosed.

Guillain and Barré (94) observed one patient with delayed apoplexy. He lost consciousness at the moment of the explosion, and for a month remained depressed, asthenic from the physical and psychical points of view, without localized paralysis, without clear reflex disturbances, with only a slightly ataxic gait and some nystagmiform jerks; the cerebro-spinal fluid was normal. At the end of a month sudden subintractant epileptiform attacks, coma and death within twelve hours. At the post-mortem diffuse encephalic congestion and a recent hæmorrhagic focus were found on a level with the lenticular nucleus and of the anterior arm of the internal capsule; this focus was certainly due to a secondary rupture of a badly repaired vascular lesion, dating from the commotion.

Joltrain (106) has also recorded the case of a soldier who died sixteen months after a 210 shell had exploded near him. He had transitory loss of consciousness; was evacuated a month after the occurrence, and since then had persistent headaches, some disturbances of memory and attention, a certain torpor, but without any great intellectual deficiency, for he had rejoined. He died in a state of coma after some days of somnolence. A large emollient focus was found to have formed round an old coagulum; this coagulum from all appearances dated from the time of the commotion.

These observations are interesting from the view point of appreciating the physical value of old commotional cases; up to now they have been exceptional. Within a short time we have, however,

recently observed three patients, who, as the result of shell explosion in the immediate vicinity, with or without projection, but without any fall on the head, or loss of consciousness, were able to continue their military service and only showed signs of organic hemiplegia at the end of several days (several weeks in one case); meanwhile they had only felt a certain amount of general fatigue. In these different cases the hemiplegia, moreover, was relatively slight, and was more or less rapidly retrogressive; in one case it was very marked for several months, then retrogressed to such a point that the patient was able to go back to the front. The patients were young, non-syphilitic, non-paludal, and non-cardiac; and it seems difficult not to admit a relation of cause and effect, even if somewhat delayed, between the shell explosion and the cerebral lesion.

It is always a delicate matter to interpret similar cases from the point of view of their pathology and medico-military consequences; nevertheless, they appear to reveal a special fragility, more or less lasting, in the cerebral vessels of certain commotional patients. It would be unjust to disregard this acquired fragility in the appreciation of focal lesions which they might ultimately reveal.¹ This question, big with consequences, merits the most ample research.

To these focal cerebral lesions we must add the exceptional cases, in which more or less fully attested epilepsy has been the consequence of a commotion

¹ To these cases of secondary or retarded hemiplegia must be added cases of epilepsy and also cases of diffuse amyotrophia, which came under our examination in analogous conditions, and of which we shall speak later.

from shell explosion; up to the present we are only acquainted with those of Guillaín and our own case.

Guillaín's two cases (87) concerned attacks of generalized epilepsy. In one, a *chasseur* (light-infantryman) was playing with three comrades when a shell burst; his three companions were killed; he fell down without being touched, but was able to get up again by himself and walk. An hour later he had his first attack of epilepsy, the following day three more, and each consecutive day, during the six weeks he was under observation, he had three or four typical epileptic attacks, with sudden onset, tonic and clonic convulsions, loss of consciousness, consecutive amnesia; neither sensory nor reflex motor disturbance; cerebro-spinal fluid normal. In the second case, the patient was a *Zouave* under whose trench a mine exploded; the following day he had his first clearly comitial attack, and several similar ones on the succeeding days; no other trouble, slight lymphocytosis.

The case which came under our observation (126) was manifested by attacks, clearly of Jacksonian character:

Louis, artilleryman, aged 23: one evening, eight months previous to our examination, his horse's head was blown off by a shell coming from the left; he was thrown backwards and fell upon his left hand, but—he is very positive on this point—his head was not touched; he got up again at once. During the night, one or two hours after the accident, he had his first convulsive attack, starting on the right side, with rigidity of the limbs, biting of tongue, foaming, etc. The second analogous attack only occurred some months later, then three attacks during the

space of one month. The last was watched: it began in the right arm and extended, with loss of consciousness, biting of tongue, blood-stained froth, stertor, with purple face, consecutive obnubilation; it was clearly a case of Jacksonian epilepsy.

This case is particularly instructive, because it was possible to verify that he did not fall on his head,¹ and because the Jacksonian character of the attack made it possible to localize the cerebral lesion (very probably cortical hæmorrhage) on the left side, that is to say, just the side from which the shell came.

Perhaps epilepsy, as the result of commotion, is more frequent than one believes; but the interpretation of facts is nearly always difficult when it is a question of epilepsy. The first attack, indeed, is but rarely a sign of cortical or sub-cortical cerebral hæmorrhage itself; it is ordinarily only produced at the moment of sclerosis of the hæmorrhagic focus, that is to say, later, at a period when it is almost

¹ In another of our cases, a series of vertigoes and absences of a comitial character supervened eight days after the explosion of a large shell a few metres away; but the relation of cause and effect does not appear to us to be entirely indisputable; it is one of those cases of which the interpretation is always so delicate.

A case recorded by Leriche also does not seem to us either to be immune from discussion as to the causal lesion; it concerns Jacksonian epilepsy localized in the left arm, but at the same time there was transitory left brachial monoplegia, and the patient, thrown down by the shell explosion, is said to have awakened with a small contused wound in the right parietal region. The bone was intact, but there was slight supra-dura-mater hæmorrhage, and the brain was cedematous, contused, with fine pia-mater hæmorrhage over a patch the size of a five-franc piece. The local cerebral contusion from shock on the cranium, even with osseous integrity, appears to us, in this case, more likely to be incriminating than the pure commotion from the bursting shell.

impossible to establish any relation between cause and effect.¹

(C) LESIONS OF THE MESENCEPHALUS

Mesencephalic lesions appear to be relatively frequent.

Guillain (91) mentions a corporal near whom a minnenwerfer projectile burst. Examined two days later, he was found to have very pronounced deafness and symptoms recalling those of sclerosis in patches, scansion of speech, exaggerated reflexes, Babinski sign present on both sides; left adiadococinesia. Lumbar puncture cured the deafness, but not the cerebro-spasmodic symptoms. Guillain thinks that this cerebellic syndrome, typical of sclerosis in patches, is doubtless due to small, more or less diffuse, lesions of the mesencephalus.

Rist (206) has observed a soldier who, after an explosion, presented cerebellic phenomena of an organic nature: difficulties in walking and of speech, diadokokinesic disturbances, nystagmus; the symptoms receded slowly.

Henri Français (75) has seen two commotional patients presenting ataxo-spasmodic phenomena by encephalic lesion affecting the cerebellic passage: one

¹ What we have been able to prove much more clearly and frequently than the appearance of attacks is the considerable augmentation in the number of the attacks in a genuine epileptic, owing to the events of war. Such a one living quietly, far away from noise might, for example, only have attacks every three or four months, but would have them nearly every day in the bustling life at the front, even when sheltered from violent commotions or emotions.

of them had dysmetric hyper-reflectivity, a cerebellic spasmodic gait, nystagmus; clear hypertense cerebro-spinal fluid somewhat hyperalbuminous, with slight lymphocytosis.

Pitres and Marchand (194) have reported a post-commotional cerebellic syndrome, remarkable for the great number and clearness of the cerebellic symptoms; troubles of gait and of cinetic equilibrium, synergic diadokokinesic disturbances, etc. In an observation of post-commotional pseudo-sclerosis in patches by the same authors, a series of symptoms of more or less purely cerebellic characteristics are recorded: intentional tremor, staggering and unstable cerebellic gait, monotonous and trembling speech, although no scansion, rigidity or muscular weakness, etc.

We ourselves, with Schœffer (140), have observed a very curious case, which we consider unique of its kind up to the present. The lesion following the commotion was situated in the bulb and in the upper cervical region; in all probability it was a case of hæmorrhage. But the symptoms were so slight that the patient was sent back to the front at the end of several months.

Mathieu, aged 26; a large calibre shell exploded to his right about 3 metres distant; he was not touched by a single splinter. He fell on his face and lost consciousness immediately. Came to himself three-quarters of an hour later.

He presented a typical Millard-Gubler syndrome: paralysis of right side of face, and of left limbs; arm flaccid, leg rigid. Further, there were very marked disturbances of speech, deglutination and mastication. The paralysis, dysphagic and dys-

HÆMATOBULBIA FROM COMMOTION.

Lesions of the centres of the cranial nerves V. to VII., and of the medullary segments, cervical ¹ to cervical ⁵. Remarks:—

FIG. 1.—Flattening of the face, prognathism, sinking in of the upper lip, disappearance of the right maso-genial furrow, inclination of head, elongation of neck, sloping shoulders.

FIG. 2.—Tongue attenuated, furrowed, specially atrophied and slightly turned to the right, lips attenuated; mouth drawn to the left, left naso-genial furrow more marked.



For description, see page opposite

arthric disturbances, improved during the following months, so much so that at the end of six months he was sent back to his depot, and at the end of ten to the front, to the first line, in one of the places most violently bombarded. He was sent back to us suffering from hysterical mutism; when he found himself back in the line he unconsciously reproduced the real troubles he had formerly suffered from.

When examined nearly a year after the accident, he no longer presented any paralysis of the limbs (with the exception that the left patellar reflex was a little too strong), but a very complex syndrome comprising :

(1) Atrophic paralysis of the face, lips, masseters, tongue, pharyngeal and laryngeal muscles; of the sterno-mastoids, trapezes, supraspinous and infra-spinous, pectoral, rhomboids, of the diaphragm; bilateral paralysis, but more marked on the right;

(2) Serious disturbances of taste, and loss of hearing on the right;

(3) Great diminution of sensibility in the cervical² region on the right;

(4) Slight atrophy of the hands of Aran-Duchenne type, and strong dissociation of sensibility of syringomyelic type (great diminution of thermic sensibility) on the level of the hands and fore-arms;

(5) Slight atrophy of the legs, especially the left, with abolition of the Achilles reflex and incomplete syringomyelic dissociation on the level of the leg on the same side.

These symptoms indicated in no uncertain way an organic lesion having touched: on the level of the bulb, the whole of the origins of the cranial nerves

from the Vth to the XIIth pair ; on the level of the upper cervical region, the three or four first medullary segments. Judging from the abruptness of the commencement and the serious disturbances of the thermic sensibility, it was very probable that it was a case of bulbo-cervical hæmorrhage. The moderate disturbances of the lower limbs were perhaps due to the same lesion, or more probably to a lesion of the same nature of the lumbo-sacral medulla.

What was particularly remarkable in this case was the extent of the bulbo-cervical lesions which might be due to a commotion, and also the long survival of the patient, whose restoration was at first sight sufficiently complete for him to be sent back to the front.

Traumatic hæmatobulbia is very exceptional ; we have not found a single case in literature ; there is not one in the 266 observations of hæmatomyelia in the Thesis of Jean Lépine. This extreme rarity is without doubt due especially to the fact that survival is exceptional ; immediate death must be the almost unvarying consequence in similar lesions, and it may be asked whether the cases of sudden death close to a shell explosion, which were reported in fairly large numbers at the beginning of the war, were not in reality sometimes due to such bulbar hæmorrhages.

Another of our patients was remarkable for the complexity of the symptoms he presented, which seemed in no way explicable except by two lesions at least of the bulbo-protuberantial region.

Narcisse, aged 24, found himself in a barrage fire of large shells (probably 210 calibre) ; he was thrown down and lost consciousness. He did not come to

himself again until the following day in the field hospital. No bleeding from either nose or ears, neither wound nor ecchymosis, with the exception of a wound of the right eye (large wound of the cornea). Lumbar puncture yielded a hæmorrhagic fluid; another puncture, made some days later, only showed lymphocytosis. He was found to have :

- On the left : very unequally distributed hemiplegia ;
- On the face : slight, lower part only ;
- On the lower limb : more pronounced, clearly spasmodic, and rapidly improved.

The patient was always able to move his leg in bed, and was soon able to stand and walk, then run and support himself on his lame leg ; exaggerated reflexes, clonus of foot, extension of toes ; moderate atrophy of thigh. •

In the upper limb, total and absolute, flaccid and durable ; arm pendant, inert, analogous to total and complete paralysis of the brachial plexus ; great weakness of the radial reflex (cervical ³), with exaggeration of the cubito-pronator reflexes (cervical ⁶), oleocranial (cervical ⁷) and radio-flexor (cervical ⁸) ; very noticeable atrophy of the whole limb, including the muscles of the shoulder ; tendency to spasmodicity only after several months, with the return of some movements.

• To the left : deviation of the uvula, absence of electrical excitability of the muscles of the soft palate on the left (paralysis of palate) ; voice nasal, with paralysis of the left vocal cord and slight atrophy of the larynx on the left ; transitory dysphagia and pharyngeal anæsthesia ; moderate disturbances of the movements of the tongue, especially towards the

right; loss of power of lifting shoulders (paralysis of trapezius), slight sterno-mastoid paresis.

On the right: total atrophic paralysis of masseter, loss of movements of diduction of jaw towards the left with absence of faradic excitability of the masseter and temporal (paralysis of the motor trigeminus); anaesthesia of the whole of cutaneous and mucous domain of the trigeminus; total paralysis of the external oculomotor, without paralysis of the facial nerve.

This symptomatic whole does not seem as if it could be explained except by two simultaneous lesions, dating from the commotion, and certainly hæmorrhagic (blood-stained cerebro-spinal fluid); on the left, the one had without doubt injured the bulbo-cervical centres of the spinal, of the hypoglossic and of the brachial plexus (extending down to cervical ⁵); to the right, the other injured the bulbo-protuberantials of the Vth and of the VIth pair and touched the pyramidal fasciculus. It seems difficult to imagine a unique, bilateral lesion, long, narrow and twisted enough to alone explain the whole of the symptoms.¹

(D) VARIOUS LESIONS

It is exceptional that muscular atrophies should be produced after commotions. Together with

¹ To these examples of mesencephalic lesions from commotion we can add the observation of a patient who, after a fall from a scaffolding on to his head, without any sign of fracture, was found to have a protuberantial syndrome, characterized essentially by hemiplegia, followed by intense hemiatrophy with homolateral lingual hemiatrophy (132).

Froment, and Mahar (138) we observed a very curious case of generalized amyotrophy, but have not reached any decision as to its anatomical lesions and pathogenesis.

Oscar was in a trench 50 centimetres deep when a large calibre shell exploded 3 or 4 metres from him; he was not touched by any splinter, but simply powdered over with earth. During the course of the two succeeding days, he had much trouble in following his comrades during the short marches of 1 to 4 kilometres; neither could he buckle his haversack himself. On the morning of the third day, he still had difficulty in marching 3 kilometres from the camp to the trenches; he sat down in the trench, and was unable to get up with or without using his hands. He was taken to the clearing station, supported under his arms, a distance of 200 metres, and then evacuated to a hospital near. That evening the muscular impotence was so complete that he could not lift his food to his mouth, and it was necessary to feed him.

He remained lying down for three months, arms and legs completely powerless, incapable of sitting himself up in bed or even of remaining seated; the movements of his head and neck alone were normal. Then generalized muscular atrophy developed. Never any sphincterian trouble.

We saw the patient three months after the occurrence. At first sight the case appeared of myopathic type: diffuse muscular atrophy of the limbs, especially at their roots (with notable atrophy of the hands of Aran-Duchenne type); considerable atrophy of the sacro-lumbar masses, dorsal cyphosis and lumbar lordosis, abdomen convex; face slightly atonic,

mouth half open ; eccentric laugh, duck-like gait, method of raising himself by creeping on his thighs. Further, on electrical examination, durable galvanotonic contractions (and also slight reaction of degeneracy). No sensory disturbance. No atrophic cutaneous trouble. No sphincterian trouble.

The diagnosis indicated seemed to be myopathia ; although the atrophy of the hands and an incomplete reaction of degeneracy seemed to but little favour this view, these two symptoms had been absent in certain cases of undoubted myopathia.. What caused doubt was the manner in which the troubles began ; indeed, one could hardly believe in a mere coincidence between the shell explosion and the production or revelation of muscular deficiency. The patient, who had taken part in several battles, had never before had any difficulty in walking, running, raising himself rapidly, even in "falling back" on the march ; he had never had any awkward fall, and eight days previously he had completed a long forage.

But the evolution was still less favourable to the idea of myopathia ; within the period of some months, we saw the different disturbances successively not completely cured, but manifestly retrogress before our eyes.¹

How must one interpret this case ? Must one continue to believe in myopathic atrophy despite the anamnesia and retrogressive evolution ? Can one believe in myelopathic atrophy when no single sensory symptom recalls hæmatomyelia or syringomyelia and the diffusion of the atrophy renders this

¹ We have recently received news informing us that the retrogression was arrested and the patient remained to a great extent amyotrophic.

diagnosis as little probable as that of anterior poliomyelitis? Must one think of an atrophy of polyneuritic origin when the appearance of the disease is so different from that of ordinary polyneuritis, and it is the evolution towards cure alone which incites one to make this diagnosis? We know nothing about it. Whatever it may have been, the chain of facts is so striking that it is very difficult not to believe in a relation of cause and effect between the bursting of a shell in the immediate proximity and this syndrome of diffuse amyotrophy.

We have also seen another patient, who apparently presented analogous symptoms.

Pascal, aged 23, was in a first line trench in March 1915 when a large calibre shell (105 or 120) burst on the parapet at 1 metre to 1.50 metre in front of him and a little to his left. He was sitting down and was buried up to the waist, but not hurt in any way, having only the slightest excoriation on his face. He felt tired, but did not even go to the clearing station. The following day he felt still more fatigued, and was given a relatively easy post; his feet were frozen, and he was evacuated five days after the occurrence.

It was during the evacuation journey that he felt the first symptoms: inability to unbutton his breeches, to get up into the compartment again, to write a post-card; in the train he had to be helped up, as he slipped down. He arrived at his destination with all four limbs completely paralysed and a little feverish, but he never had either pain, anæsthesia or hypoæsthesia, or sphincterian troubles.

Lumbar puncture was supposed only to show hyperalbuminosis (?).

From the fifteenth day after the occurrence a certain degree of atrophy of his four limbs was said to be proved. After numerous peregrinations he arrived at a neurological centre, in May 1916, where a note was made of "generalized muscular atrophy of all the muscles of the body, except those of the head, with localization by predilection of the brachial biceps, of the extensors of the forearm, of the thenar eminence, of the interosseous, of the femoral quadriceps and of the trigeminus; without disturbances of either the electric reactions or modifications of sensibility." Progressive improvement. A fresh lumbar puncture yielded nothing abnormal.

When we saw him, in October 1916, we could find nothing more than slight atrophy of the upper limbs and especially of the extremities, of the muscles of the dorsal side of the forearm, of the interossei, of the hypothenar eminences and of the internal portion of the thenar (simulating an atrophic bilateral cubital paresis); slight atrophy of the lower limbs, especially of the left calf; no reflex or sensory disturbance.

In this case, although we were unable to follow it in its earlier stages, there was apparently generalized amyotrophic paresis, following shortly after the traumatism, with very rapid progressive, then slow retrogressive, evolution, without, at any rate qualitative, sensory or sphincterian disturbance or modification of the electric reactions. As in the preceding observation, diagnosis seemed to us to waver between hæmatomyelia and polyneuritis, both of which, moreover, would have been very abnormal, owing

to the intensity of the amyotrophia and the absence of sensory signs.¹

Henri Français (74) has recorded a probably analogous case, in which myopathia of facio-scapulo-humeral type developed two months after a commotion, at first on the face, then on the shoulders. This author has also seen a case of progressive, then retrogressive, acquired myotonia after a commotion. He notes that these acquired dystrophias are apparently capable either of retrogressing or of being only of limited extent.

There is no doubt that those muscular atrophies, or rather glabrous and rapid attenuation of a limb or part of the body, which, according to Roselle and Oberthür (210), are sometimes inducted some days after a commotion, nearly approach the above observations. These authors have observed two cases of this kind; at the end of two months recovery was almost complete.²

Auricular commotions affect either the middle or the internal ear: hæmorrhagic phlyctænæ in the thickness of the tympanic membrane, effusion of blood in the drum, tearing or rupture of the tympanum; labyrinthal commotions with the different varieties of the tripus of the *Menières* syndrome, deafness, humming and vertigo.

¹ While this volume was being printed, we observed a series of cases of amyotrophia developing rapidly after a commotion; the evolutionary and electrical characteristics of certain of them forced us to believe in a hæmatomyelitic origin.

² Pitres and Marchand (194), Villaret and Jumentié (230) have described post-commotional takes of rapid evolution, with negative Wassermann; Mairet and Durante (154) think the condition may be due to small radicular hæmorrhages.

These auricular commotions are extremely common; indeed they are by far the most frequent: one may say that the ear, owing to its functions and structure, is a favourite locality for experiencing the effects of commotions. Up to a certain point one might even say they serve as the touchstone for estimating the reality or not of a nervous commotion. But, on the one hand, there are obvious commotions of the nervous centres without any auricular commotion; while, on the other hand, auricular commotions, in the absence of otoscopic verification and of proofs of sincerity, may be too easily simulated by simple neuropathic auditory disturbances; in short, the presence of most definite auricular commotions does not exclude the existence of purely functional disturbances of the nervous centres.¹

These auricular war commotions from cranial shock or deflagration have been extremely well

¹ We have also stated that the varieties of voltaic vertigo, which are extremely frequent, appear to be able to serve as an indication in cases where one would hesitate between a true commotion and a false cerebral or medullary commotion. But these are not of the capital importance that certain authors [Français (75), Moutier (184)], and we ourselves considered them. For, on the one hand, a simple lump of earth or of cerumen may cause serious symptoms of voltaic vertigo, and, on the other, we are in no way convinced, after certain researches, that a simple strong emotion, which may cause symptoms of pressure of the cerebro-spinal fluid (and perhaps even a slight albuminosis, as the effect of hypertension), may not also cause important quantitative and more or less durable varieties of voltaic vertigo.

We may say the same of the symptoms of vertigo and signs of labyrinthal perturbations which Cestan, Descomps and Sauvage (35) have found in the majority of commotional cases from aerial shock, and which we have also observed in a certain number of emotional patients.

studied by Bourgeois and Sourdille (29) in another volume of this same series; we shall, therefore, not describe them here.

The eye does not appear to be a favourite site for commotional disturbances.

Certain lesions have been described by some authors [Lagrange (108), Terrien (226), Haas (98), Ginetous (80), etc.] as capable of being caused by a simple shell explosion at close range: hypohæmia, hæmorrhage and vitreous exudations, retinal commotion with œdema and macular hæmorrhage, tearing of the choroid, etc. This interpretation is denied by others [Landolt (115), Viëlle, Pélicaud, etc.].

The interesting report of Coutela at the Society of Ophthalmology (47) is only concerned with functional troubles from commotion; he does not come to a definite conclusion, as to the existence or not of organic lesions of the eye from pure explosion. For this author, the commotional ocular syndrome would include blepharospasm, photophobia, blindness, amblyopia, retraction of the field of vision. Mawas (174) considers this syndrome as being of functional type, and the true commotional ocular syndrome of organic origin would include photophobia, accommodative asthenopia and the diminution of visual acuteness [already reported by Babinski (7)]. MacAliffe (153) has observed a diminution of the field of vision and of acuteness of vision in 50 per cent. of the cases.

We have no authority for judging differently, and can only say that pure and true organic ocular commotion is certainly rare.

Visceral hæmorrhages, hæmoptyses from rupture of the pulmonary vessels, hæmatemeses from gastric

erosions and hæmaturia, probably of vesical origin, appear to be fairly frequent commotional symptoms [Ravaut (196), Leclercq (118), Sencert (219), Binct (24), Piéry (193), etc.]. Crouzon (49) has reported profuse naso-pharyngeal hæmorrhages.

Loeper and Verpy (147, 148) think that glandular hæmorrhages, affecting the kidneys, the suprarenals, the liver, pancreas, etc., are doubtless sometimes responsible for the humoral variations and glandular insufficiencies they have observed in commotional patients.¹

¹ Milian (182) and Gougerot (81) do not believe in the provocative influence of commotions and emotions on cutaneous affections, psoriasis, alopecia areata, etc., an influence which, on the other hand, is admitted by Gaucher (78) and Brocq (31) in the case of psoriasis.

CHAPTER X

NATURE AND PATHOGENESIS OF COMMOTIONAL LESIONS

IF we except the large focal lesions, which are relatively rare, we know practically nothing of the pathological anatomy of the SIMPLE COMMOTION of the nervous centres. Test autopsies are still quite rare, and the examinations have been made under conditions which are too dissimilar from clinical ones to enable any certain deductions to be drawn from them, which are applicable to the man who is simply suffering from shell commotion and not from contusion.

The lesions described before the war, which probably correspond to those of commotional battlefield cases, refer to the nervous cells and the vessels.

The cellular lesions should be of mechanical character; resulting either from a sudden jarring of the brain against the skull, due to the displacement *en bloc* of the cranium, or from strong vibratory movements transmitted from one part to another (an analogous pathogenesis would also, of course, apply to medullary commotions). The attrition or vibration would determine not only the displacement, but also the deformations of the nervous substance; the extent of the deformation would be largely increased by the existence of the cerebrospinal fluid mass, which is essentially depressible.

These mechanical lesions should consist essentially in the nervous elements sliding over each other, with rupture of their protoplasmic elongations, dilaceration of the axis cylinders and of the medullary sheaths, etc. [Luxenberger (152)].

The vascular lesions should be of reflex order; they should result from vasomotor paralysis (cerebral or medullary) at the commotional points and consist of abrupt more or less localized or diffuse congestion. The congestion might extend to vascular rupture; hence the numerous capillary hæmorrhages which have been observed in numbers of clinical cases by Fano, Sanson, Blandin, Nélaton, Chassaignac, and later by Leriche (143), in numerous experimental examples by Schmaus, Chipault, Jean Lépine (122), Scagliosi (215), Stcherbak (225), etc., and more recently by Mairét and Durante (154) when employing explosives.¹

¹ In all these cases, whatever the commotional agent (hammer, vibrator or explosive), the fine, fragile, terminal and badly supported vessels have nearly always burst in the grey matter, at the level of the cerebral cortex, especially of the central grey masses, or at the level of the forceps minor. It is hardly ever at the level of the lenticular striated artery, the most ordinary source of reputed spontaneous cerebral hæmorrhage, which is sometimes post-emotional.

Mairét and Durante have experimentally proved diffuse capillary hæmorrhages in the case of rabbits. They conclude that all commotional patients have not a focal cerebral lesion (which seemed certain to us), but they believe they must also conclude from this that there are no false commotional cases; we are convinced that in this interpretation there is only a confusion of words or a misunderstanding. (In a previous work we had no intention of designating under the term "false commotional cases" patients without any focal lesion, but, rather, emotional patients, especially hysterical ones, who are often cured in a single treatment by

To the primitive lesions, cellular and vascular, are rapidly added lesions of reaction, commonplace lesions of encephalitis or of myelitis: progressive and necrotic degeneration of the cells, return of neurology to the embryonic state, leucocytic infiltrations, granular bodies, endarteritis and periarteritis, then sclerotic edification of a tissue. Around the hæmorrhagic suffusions foci of necrotic softening may develop.

Whatever the part played by vascular lesions and more or less microscopic hæmorrhages, where the dislocation of great elements dominates the cellular lesions, the loss of their mutual attachments will account equally well for the symptomatology of the emotional states, where inertia, asthenia and amnesia dominate.

A commotion is defined as a transmitted concussion; when the cranium is intact the concussion, due to either direct or indirect shock, can only be transmitted by the osseous skull. This, which, as it were, vibrates through its entire being, transmits the shock to the whole cerebral mass, causing throughout a sort of microscopic dislocation, or at least a functional inhibition. This explains both the large diffusion and the weak degree of the lesions

suggestion; it is obviously not admissible that all these patients should have hæmorrhage of the nervous centres, even though microscopic!

The quite special conditions in which Mairé and Durante recognize they were obliged to place themselves, in order to obtain some results (explosive 1 metre at most from the animal, and the relatively considerable amount of 1 kilogramme of cheddite), would be a genuine confirmation to us, if it were necessary, of the relative rarity of true commotional cases with diffuse, or focal, lesions.

in the majority of clinical or experimental cases, naturally putting on one side the cases where the shock, which was too strong and too localized, caused lesions of local contusion.

This doubtless also explains the fact, many times proved during the war, and of which we can confirm the accuracy, that there is only rarely a genuine commotional condition of psychical and physical inertia when there is perforation of the cranium. It seems that, up to a certain point, this is the case with commotion as well as coma. Pierre Marie and Kindberg (171) have shown that persistent coma is only produced during cerebral hæmorrhage when the two cerebral hemispheres are inhibited. The true commotional condition, a state of diffuse inhibition, only seems to be produced if the concussion is transmitted throughout the two hemispheres. Therefore, for this the cranium must be intact; like a cracked bell, an open, or even only cracked, cranium no longer vibrates, the concussion is no longer transmitted to the cerebral mass, the wound produces symptoms of local lesion, of contusion, of irritation or cortical deficiency, but not diffuse symptoms like the physical and mental inhibition of true commotion.¹

There are but few true commotional symptoms even in the case of extensive loss of osseous substance. Amongst the examples we have observed,

¹ Certain authors, having at a late date discovered analogous sequellæ in trepanned patients and those retrospectively reputed commotional, have questioned whether all trepanned patients are not before all commotional. This, from our point of view, is entirely ignoring the first phases following the wound, which are of capital importance in the appreciation of these facts.

exceptions were only found in two varieties of cases: on the one hand, those in which intense cerebral, or especially meningeal, hæmorrhage caused a bilateral compression, and on the other, those in which a very deep lesion of one hemisphere, with a large issue of cerebral matter, was sufficient in itself to cause a diffuse inhibition, a shock.

• Large hæmorrhages must, *a priori*, have the same pathogenesis as small ones; there is only a difference of degree in the volume and the site of the injured vessel and in the size of the wound.

Thus, when the first focal hæmorrhages from explosion were reported, it seemed natural to admit that the explosive gases and atmospheric air, violently compressed around the cone of the explosion, acted like a solid body, the hammer, for example, with which commotions are caused experimentally. The gaseous shock would strike the cranium, or the spine, and the vibrations would be transmitted to the brain or medulla. This gaseous shock, which breaks the windows in the vicinity, might well be strong enough to rupture the vessels in the nervous centres.

This theory fitted in very well with the violence of the explosions due to large calibre projectiles. It responded also to a violent sensation from a thump, a box on the ear, a blow from a cudgel, the back broken to pieces, that the majority of soldiers have felt when subjected to an explosion: this painful sensation, as a general rule, has been felt just at the part of the body at which, according to the clinical symptoms, the lesion is situated (forehead, temple, neck, back, loins).

Further, the site of the lesion has generally seemed to us to have relation to the place where the shell fell with regard to the patient. Thus, in all cases in which there was paraplegia from medullary commotion, where the point of the fall was noted, the shell had fallen behind the patient (cases of Froment and of Joubert, Nos. I. and III. of Heintz, No. IV. of Souques, personal case, etc.).¹ In a case of right Jacksonian epilepsy, the shell, which fell at the soldier's feet, came from the left—that is to say, from the side where the cortical lesion occurred. Similarly, du Roselle and Oberthür have seen a large ecchymosis of the right thoracic wall and right pleural effusion in a patient to the right of whom a 105 shell exploded, and who, being on his knees, fell on his left side. Another soldier, thrown down under the same conditions, had an intra-muscular hæmatoma of the right thigh and an osteoma of the right femur. Another was lying down when a 105 burst behind him; he felt a violent shock on his feet, and both were fractured, his boots becoming like tinder, without his having the slightest excoriation. Thus, the gaseous shock had caused an attrition in the depth of the tissues.

This very simple and logical theory of the gaseous shock does not appear to have been sufficiently explanatory of certain cases, especially those fairly rare ones in which there was neither sensation of shock, loss of consciousness nor fall. Commotional symptoms, mainly owing to the fact that they often

¹ The sole exception is Heitz' case V., where the shell fell in front of the patient; but he was thrown into the air and fell on his back; the fall may have been the cause of the hæmatomyelia.

consist of hæmatomyelias, were compared to caisson disease: they were attributed to decompression.

As a matter of fact, the sudden detonation of the shell and the expansion of the gases cause an atmospheric vacuum in the explosion cone and compression of the surrounding air; but directly afterwards an enormous assemblage of air is produced and a forcible decompression.

• This theory soon received the support of a proof which was considered as almost experimental. An aneroid barometer was found in an officer's pocket, who had been 3 to 4 metres from a large calibre shell when it exploded; this barometer had been put out of action by the explosion. Arnoux (2) stated that the disarrangement of the apparatus was due to intercrossing of the levers; he uncrossed them, and put the apparatus under the bell of a pneumatic machine; he saw the intercrossing reproduced when the pressure had descended to 410 millimetres of mercury—that is to say, almost the pressure at the summit of Mont Blanc. Thus, the instrument had worked like a minimum barometer, and it indicated that the sudden atmospheric depression had momentarily reached at least $760 - 410 = 350$ millimetres of mercury, corresponding to a rapidity of atmospheric compression of 276 metres per second and to a dynamic pressure of $10 \cdot 360$ kilogrammes per square metre. The decompression borne by the officer had, therefore, been that which he would have been subjected to if he had been suddenly transported to the summit of Mont Blanc.

This statement proves that there is a strong decompression immediately after the explosion of a shell, but does not prove that this decompression has more

pathological action than the pressure which forcibly precedes it. 'Arnoux' barometer worked well as a minimum barometer, but could not work like a maximum one.

A fact has been invoked in favour of this theory of decompression, showing that the windows broken by explosions fall outside the houses and not inside. But, in the first place, this fact is far from being constant, and many officers have assured us they had been sprinkled, and even wounded, by splinters of glass projected inside their quarters when a shell exploded outside. Further, two phenomena which are successive and not simultaneous must not be confused, namely: first, the smashing of the glass, which may occur under the influence of pressure, and then the fall of the pieces, which may take place outside under the influence of the depression which follows immediately, a fraction of a second later. Indeed, when a non-resistant and unbreakable object, such as a curtain or a cover, is found, for example, at the entrance of a shelter where a projectile explodes, it is to the end of the shelter *farthest* from the explosion that it is thrown. Other observations also show that soldiers are thrown far from the shell, and often with great violence.¹ This single, frequent and commonplace proof would prevent us granting to decompression an exclusive or merely

¹ Binet (24) thinks it is possible to distinguish between shells with a vertical projection cone working by depression, and sometimes attracting the soldiers, and torpedoes working rather by pressure. It seems to us difficult to accept this differentiation, for between the projectiles there is only a difference of charge in relation to the mass of metal used in the case; further, we are unacquainted with any instance which proves the attraction of the soldiers towards the projectile.

predominating value, even if it were not fortified by the observations of which we have already spoken.¹

In connection with the symptoms of caisson disease, Paul Bert had already admitted the escapement of gases from suddenly decompressed blood, in the same way that gases escape from a bottle of champagne directly the cork is removed. These gases will cause gaseous embolisms, and subsequently hæmorrhages, either from capillary rupture,² or from the mechanism of the infarct. Jean Lépine (122) has also invoked the freeing *in situ* of the dissolved gases in the organic centres, and Bouchard (28) has for a long time incriminated the distension of intestinal gases in suddenly driving back the abdominal blood towards other regions.

Jean Lépine has reported the helicine distension of the medullary vessels and also, under the ophthalmoscope, the sinuous distension of the retinal vessels. He attributes this as much to the force of the pressure driving back the blood of the abdominal viscera, as to the sudden depression setting at liberty the gases of the blood, of the tissues or of the intestines, and tending also to force the sanguinary

¹ Mairé and Durante (154) do not admit the part played by pressure, gaseous shock and cerebral vibrations, because the hæmorrhagias they tested experimentally were minute and diffuse. But the shock is not applied directly to one point of the brain; as we have explained, it is transmitted to the cerebral mass by the whole of the osseous skull. Further, we do not see how the theory of decompression better explains these small lesions than that of pressure.

² The disengagement in mass of the gases of the blood is said to be particularly important, according to Piéry (193), in the genesis of pulmonary hæmorrhages; the capillary mass is said to burst with particular ease in the empty space of the alveolus.

fluid back towards the regions of the nervous centres, which are particularly well protected by their osseous envelope.

It must be acknowledged that this theory of disengagement of the gases, attached to the theory of decompression, is still hypothetical.

Up to the present, we have not alluded to the theories which bring in the cerebro-spinal fluid. The theories in question are old, and considered obsolete, and, as far as we know, have not been discussed with regard to commotions from shell explosions.

Duret (72) based a theory upon a series of experimental and anatomico-pathological facts, which attributed a principal part to the cerebro-spinal fluid in the symptoms of cerebral commotion. As the result of a fall or a blow upon the head, a cone of depression of the cranial wall is produced on a level with the part affected. At the diametrically opposed point, a cone of elevation is produced; and it is, indeed, on the level of these two cones that lesions of cortical contusion of the brain are most freely observed. These may be due even to the sinking in of the os or of its elasticity, which causes it to fall back upon itself like a ventilator. These lesions may be observed despite the integrity of the osseous wall, as Leriche (144) has recently remarked in a case of shell commotion.

If the shock comes on the front or summit of the cranium, "no cone of elevation will respond to the cone of depression, for the base of the cranium, supported by the spinal column, cannot move: it is then the bulbar ventricle which forms the ready-prepared cone."

Further, the flattening of the cranium by the shock compresses the encephalic mass,¹ drives away the liquid content of the ventricles, and squeezes from the brain, as from a sponge, the cerebro-spinal fluid with which it is gorged.¹ The liquid flow thus formed is forced into the aqueduct of Sylvius, the fourth ventricle, the subarachnoid spaces and the central channel of the medulla, causing a genuine contusion and tears, sometimes amounting to laceration, of the protuberance, of the bulb and of the cervical region.² "In cerebral commotion," Gérard-Marchant says, "the shock is not sufficient to bring about lesions of the circulations, but the reflux of the cerebro-spinal fluid has produced ventricular tears (floor of the 4th ventricle). Commotion and confusion are engendered by the foci, large or vascular tears, but in the commotion the lesions are ventricular, whereas in a contusion they are cortical."

An observation by Duplay (65), who verified the hæmorrhage and rupture of the bulb in a wounded patient who had died from lightning commotion,

¹ Leriche, Baumel (19), etc., have tested the hypertension of the cerebro-spinal fluid, which often persists several days after the shell commotion.

² That is not all: the cerebral tissue is not only gorged with cerebro-spinal fluid, but also with blood; the blood too has been forcibly driven by the shock; it is further driven by the sudden hypertension of the fluid in the lymphatic perivascular sheaths (and perhaps further by a reflex contracture of the vessels). The blood flows fairly forcibly towards the deep parts, and may cause the large and small vessels to burst, notably those of the grey, fine, brittle and badly supported nuclei. It is this which explains the deep hæmorrhages of the brain which seem fairly frequent in commotions and particularly in shell commotions.

has given an anatomico-clinical support to this theory.¹

A certain number of clinical observations of mesencephalic troubles following shell explosions seem to us to give renewed grounds for this theory.

Certainly, it would appear to us an exaggeration to admit, with Duret, that the phenomena of commotion are exclusively bulbar, and that the inhibition of commotional patients is due to contusion of the pneumogastric nuclei which are found just at the lower end of the 4th ventricle, and to cardiac, and subsequently respiratory, paralysis.

But it must be recognized that mesencephalic lesions from simple commotion have been relatively frequent, notably those of the cervico-bulbo-protuberantial zone. We may recall, amongst others, the two curious observations we happened to collect, one of which can only be explained by a long hæmatobulbia prolonged as far as the cervical region (joined perhaps to a lumbo-sacral lesion of the same nature) (page 198), and the other by two hæmorrhagic lesions situated to the left in the bulbo-cervical region and to the right of the protuberance (page 196).²

¹ We ourselves have observed an analogous case, but artificial lesions of the region are too frequent for us to dare to affirm the authenticity of the case.

² Note, by the way, how well this theory accords with the frequent statement that commotional inhibition is very rare when the cranium is perforated. Indeed, by reason of the existence of an osseous orifice, there is neither any bursting nor forcing out of the cerebral mass, including the ventricles; in any case, the breach in the osseous case would allow a free passage for either the cerebro- or sanguinary, spinal fluid, which might for the moment be in excess.

In the presence of these facts, in a certain number of cases of sudden death in the proximity of an explosion, which, moreover, are much rarer than one would have thought at the beginning of the war, but which are sometimes indisputable, it is permissible to ask, as we have done, whether they are not due to bulbar lesions, perhaps in conformation with Duret's theory.

We must mention that the theory of bulbar shock of the cerebro-spinal fluid, thus supported by clinical and perhaps anatomo-pathological arguments, is absolutely at variance with the idea of lesions by decompression, and that it can only be an adjunct of the theory of shell commotions from gaseous shock. Further, without denying the possibility of hæmorrhagic lesions of the nervous centres by decompression (they are too well established in connection with the hæmatomyelias of divers), we believe that this mechanism only intervenes as an accessory in the great majority of cases of simple commotions from shell explosion.¹

¹ Commotional lesions are not always exclusively hæmorrhagic. Claude, Lhermitte and Mlle Loyez (45), as well as Jumentié, have proved in certain cases paraplegia by commotion (but not from pure commotion, without any wound) of small foci of softening in the medulla. Mairet and Durante believe that these softenings must be considered as secondary to perivascular hæmorrhages, followed by vascular compression and thrombosis. Joltrain (106) has seen a large focus of cerebral softening develop around a commotional hæmorrhage. It is very probable, indeed, that in cases of this kind, which appear to be rare, the softening is only secondary.

CHAPTER XI

TREATMENT AND MEDICO-MILITARY DECISIONS

THE commotional patient being, above all, a sufferer from depression of the nervous system, and mental and physical inertia, the most useful effect will be obtained by stimulation, especially of the nervous system.

At the clearing station, where means are very limited, abundant and repeated injections of camphorated oil are the favourite medication. To this caffeine and ether may be added with advantage, especially when hypotension is marked, the heart weak and very slow, pupils large, face pale and condition subsyncopal. The patient should be stretched out, with the head low, wrapped up in woollen rugs to get warm and, if he can drink, given tonic and alcoholic hot infusions; if there is time between the influx periods, he should have extensive and vigorous friction. As soon as possible he should be evacuated, lying on a stretcher, to some near-by field hospital.

At the field hospital the same means should be utilized. But here again there can be no question of lumbar puncture, except in very rare cases. Indeed the clearing station, where the wounds are rapidly dressed, is never suitable for this kind of

interference, because it is ordinarily underground, and essentially septic.

Hypertension of the cerebro-spinal fluid seems to be one of the most ordinary characteristics of commotion, and it is generally advisable to extract a certain quantity of this fluid as soon as possible. We make one reservation, however: we do not think it is necessary to deliberately perform cerebro-spinal puncture in all cases; to justify it the condition must be and remain serious. If the condition has improved up to the time of reaching the field hospital, we do not consider it advisable to run the risk of causing a relapse by disturbing the state of equilibrium which has then been reached. A sudden and untimely cerebro-spinal depression, moreover, might have the effect of reopening some vessel which had been momentarily pierced and not yet properly closed.

Neither do we think it necessary to extract a very large quantity of fluid. With regard to this it is advisable to make certain distinctions. If the fluid shows much hypertension and appears to be composed of almost pure blood, leading to the supposition that meningeal hæmorrhage persists, and if absolute torpor, hypothermia, hypotension and, later, papillary œdema give rise to the belief that cerebral compression is playing an important part in the intensity and continuity of the disturbances, the amount of fluid extracted should be abundant: these cases are exceptional in commotions from simple shell explosion. If the fluid is merely more or less tinted, and especially if it is clear with moderate hypertension, a medium extraction of 8 to 15 cubic centimetres is generally quite enough,

even if it has to be repeated later. The patient comes to himself, regains consciousness, his intellect clears, the pulse is accelerated, the pupils contract and his strength returns.

It is sometimes quite surprising to find what an efficacious and lasting effect the extraction of a very minute quantity of cerebro-spinal fluid has, even when it is no more than a few cubic centimetres. Many authors have proved this action to be attributable to the little-known influence, which even the minute extraction of fluid has "on the subsequent lowering of tension, on the secretion, and on the circulation and reabsorption of the cerebro-spinal fluid" [J. Roux (214)]. Whatever may be the pathogenic theories, not only do the symptoms improve as if by magic, but the nature of the fluid is modified with extreme rapidity; the blood is reabsorbed and a certain lymphocytosis established, which disappears in its turn.¹ The constitution of a polynucleus, even if momentary, should always put one on one's guard with regard to infection.

With or without lumbar puncture, the great

¹ In one of our cases, for example, a puncture made on the ninth day after the commotion yielded fluid still clearly hæmorrhagic. Besides very numerous hæmatia, it contained leucocytes with 80 per cent. of polynuclears, 12 per cent. of mononuclears and 8 per cent. of lymphocytes—that is to say, relatively more polynuclears and less lymphocytes than the pure blood. Two days later the fluid was clearer, the hæmatia less numerous, the leucocytotic formula being: poly. 59 per cent., mono. 10 per cent., lympho. 31 per cent. Two days later still, despite a weak evacuation, the fluid was clear, hæmatia rare, the leucocytotic formula: poly. 9 per cent., mono. 28 per cent., lympho. 63 per cent. The formula was completely reversed; it had taken, as it were, the constitution of a lymphocytosis. The obnubilation and the commotional condition had disappeared at the same time.

majority of commotional patients do not, happily, go beyond the field hospital; many of them are already kept at the clearing station for slight wounds or footsore cases; the majority, after leave or convalescence, are in a condition to rejoin their company.

It is only in some of them that symptoms of prolonged cerebro-spinal commotion are manifested, either immediately following the accident or after a period. In these cases one must have recourse to tonics and building-up diet, in the form of nourishing flesh food on the one hand, and drugs, such as iron, glycerophosphates, and especially arsenic (cacodylates) and strychnine on the other. Certain authors advocate the performance of repeated lumbar punctures even at this late period; indeed the cephalo-spinal pressure is often still high, and it is frequently seen that after each puncture the headache and vertigo diminish or disappear for the time being.

Prolonged cerebro-spinal commotion always lasts a long time; at the least a certain number of months. During this period the patients are incapable of doing any active service in the army; it is impossible to send them back to their company; there is no advantage in keeping them in hospital, for there is no subsequent treatment to be given them which cannot be carried out anywhere. The best moral treatment is to send them home to their family for the time being, especially if this enables them to have rest in the open air and an easy life; this is without inconvenience, for, as Bordehonne and Nordmann (27) have justly remarked, it is not this category of patients which become malingerers.

The best measure to take with regard to this series of true commotional cases with prolonged disturbances seems to us to be putting the patient on temporary half-pay. It will exceptionally be necessary to transform this into permanent half-pay, for these patients nearly all recover in the end, and post-commotional dementia is a rarity in any case, even supposing that its existence has been really demonstrated.¹

At the beginning, in a general way, the same rules of treatment apply to cerebral contusional cases, for these patients are often, before all, commotional ones. However, meningeal or meningo-cortical hæmorrhage is sometimes of much importance, and calls for lumbar puncture with great urgency. The continuity of the hæmorrhage, manifested by coloration of the fluid and the intensity of the signs of compression, may even require more or less extensive trepanning.

Two facts must never be lost sight of. On the one hand, the surgeon can do nothing in connection with the focus of cerebral contusion, properly so-called; he can only give effective local treatment by doing away with the cause of the continuous compression (osseous fragments or coagulum, for example). On the other hand, moderate compression is the best remedy we know of for arresting cortical or sub-cortical hæmorrhage; and the effect of trepanning is to relieve the compression which might be caused by the effusion of blood itself.

¹ For these chronic psychological weaknesses (Collin), notably after commotions, the Society of Neurology has agreed to No. 1 half-pay, with a gratuity assessment ranging from 50 to 100 per cent.

Further, early trepanning does not seem to us to be always without inconvenience. In the absence of a grave and progressive symptomatology, we think one should often know how not to hurry; the signs of shock will often diminish of themselves, or after a simple lumbar puncture; and if later the coagulum which has formed gives rise to disturbances of prolonged compression, a secondary intervention might be made with less inconvenience, under better conditions, and with greater chances of success.

Cerebral contusional patients must be regarded as seriously wounded; their lives are ordinarily in peril during a fairly long period, and their indisposition is always very prolonged. It is not merely a question of putting them on half-pay temporarily, but permanent No. 1 half-pay may also have to be considered.

Emotional patients are always tired; less perhaps than they seem to be in their apparent inertia when they are in a shelter, but more so than one would believe when they are seen trying to escape from danger. In these cases also the injection of camphorated oil at the clearing station, although not of the same importance as with true commotional patients, has none the less a favourable action; even the prick of the needle is sometimes sufficient to arouse and almost revive these soldiers, thus throwing an unexpected light on the diagnosis!

But the most important thing is to know how to recognize this category of patients at once so that the essential moral influence may be exercised on them from the beginning. It is absolutely imperative from the first to prevent them from abandoning themselves without effort to the exhaustion of their

will and energy, letting themselves go because, in quite good faith, they believe they must be atonic and inert! Nothing is more troublesome in regard to subsequent recovery than this deplorable auto-suggestion of the first moments succeeding physical and moral traumatism.¹ It is energy without roughness, friendly cheering up without abruptness, but firm, authoritative, tenacious, convinced and convincing, which the emotional soldier must find opposed to his natural tendency to inaction and giving way.

All well-informed army doctors are acquainted with, and highly proclaim the considerable part that their moral influence may play in preserving effectives during an action. This same part must necessarily be played by the surgeons attached to the clearing stations for slight wounds and ambulant cases. Certain expert divisional surgeons have had the happy faculty of foreseeing this at the time of an attack only a few kilometres behind the firing-line and at a distance from railways. This part again must be played by the doctor in charge of a military neurological centre, although his is a much longer one. The influence exercised by the practitioner is the more efficacious the nearer he is to the scene of the occurrence, when he is more likely to understand the moral condition of the patient and to inspire him with confidence in his physical strength, and if he has plenty of time at his disposal for this psycho-therapeutic action.

If it is only a question of combating simple, even if intense, emotional disturbances, a rapid, immediate and energetic taking hold of the patient's weakened will should suffice ordinarily: recupera-

tion will be almost instantaneous in certain cases ; in others it will only take place when the patient has been removed from the danger zone. In a number of cases, also, it must be noted that the emotional patients will really remain greatly fatigued for a number of weeks, and quite incapable of any active work.

If to truly emotional disturbances hysterical manifestations are added, it indicates that an element of suggestion (hetero- and above all auto-suggestion) has come into play. It is owing to the superadded element of suggestion that sudden immobilization due to fright may become paralysis, that contraction of the throat borders on mutism, that shaking of the legs or tremor of the body may develop into a persistent tremor or convulsive attack, etc. It is in these cases especially that the doctor may obtain great help from counter-suggestion exercised as soon as possible.

On the battlefield, however, the doctor has rarely time to practise the necessary psycho-therapy ; then, more or less totally unconscious fear still dominates the hysterical emotional patient to such an extent that he is quite incapable of being reasoned with, until he has reached a place of safety. Further, these emotional hysterics form the greater part of the patients of military Neurological Centres, as well as being one of the reasons for their existence.

We cannot here go into the rules for treating hysterical patients, which have been indicated with many variations by a number of authors, neither can we go into the methods we ourselves prefer using.

We keep rigorously to a few principles, which are

as follows: (1) To act always with authority and energy, but never abruptly or brutally; nothing rebuffs patients so much as being bullied, and no advantage as to recovery is gained in this way. (2) Always appear to believe the patient: he must never be allowed to think simulation is suspected, even, and perhaps especially, when in reality one has doubts of his perfect good faith; nothing makes a patient more refractory than to feel he is suspected. (3) He must be convinced that, if he is not simulating, and because he is not doing so, he cannot fail to be cured by the process used.

As to the process itself, it is only of relative importance whether it is the faradic or galvanic current, compression of the ocular globes, or of the so-called hysterogenic zones, or any other method. The element of pain certainly has an action, because pain is eminently suggestive; but it is not essential, it rather affects the rapidity of the result to be obtained than the result itself, and, in any case, it is hardly ever necessary for it to be so intense that it gives the patient the impression that he is being martyred!

If the infinitely simple principles we have enumerated are adhered to, we can say that there are neither rules nor methods in the treatment of hysterical disturbances, troubles which are essentially irregular in their manner of production and in their infinite variety. Psycho-therapy from now is merely a question of proportion and of manipulation; success will attend those who take the trouble to study the mentality of the patient, and best understand his moral condition, speak his language best, present to him the arguments most adapted to his

intelligence and condition, and, if we may be permitted the impression, those "who get best into his skin."

A military Neurological Centre must be essentially a barrage centre for these neuropaths who are more or less unconsciously hysterical, more or less consciously exaggerators, whether persistent or not. A well-organized centre must keep them all, and we can affirm that nothing is easier when the patients are properly examined and treated with care.¹ These patients returned to their company are practically so many recruits for the army, for we know how slow and difficult recuperation may often be when they have succeeded in getting inland, where too many outside influences play a particularly unfavourable suggestive part.

The results obtained in the treatment of hysterical patients in the armies, and also in certain inland services, fully justify the decision, proposed by the

¹ Out of about four thousand patients cared for by us during the last two and a half years at the Neurological Centre of the Second Army, about 50 per cent. were functional (of course, they were not all of them intensely emotional, far from that). All those were sent back to the army, with or without furlough, with the exception of four with war ginitosis, of which we have already spoken; nearly all of them were not only white-washed, because only a very limited number returned to us from amongst those whose company had still remained in our sector.

The useful action of a military Neurological Centre is felt, not only in the recuperation of these patients, but also in the moral and inhibitory influence which their return to their company exercises on those of their comrades who are more or less inclined to imitate them. As proof of this, we need only mention the diminution in the proportion of functional cases sent to us now, this proportion having recently fallen to 30 per cent. instead of 50 per cent.

Society of Neurology on the report of Bałiński (81) and our own (135), and applied by the Under-Secretary of State of the Ministry of Health, never to grant either half-pay or gratuity for purely hysterical cases.

The better results generally obtained with the armies have made us advise and adopt the plan of not only keeping all hysterical patients in the army, but also of sending back to army centres all hystericals in the inland zone who have a tendency to become refractory. This return must not be made too soon, for fear of acting as a check to a tentative cure, but it should be made relatively fairly rapidly, and be applied without any delay to patients who have been under one or at most two qualified neurologists for a long enough period (some weeks) for their moral influence to be regarded as exhausted. We believe that it would be altogether regrettable to regard this return either as a makeshift or as a measure of coercion which should only follow an interminable passage through all the inland centres.

There are nervous syndromes of emotional origin which have nothing to do with hysteria; we have described them under the names of "emotive neurosis" and "emotive neurasthenia." Therapy is badly armed against such cases, the psychical influence of the medical man being very small.

Emotive neurosis makes the patient very unfit for all military work; further, it is often fairly prolonged, and one of the most efficacious curative methods is to remove the patient from all danger and all new emotions in the first place, and then afterwards from all anxiety as much as possible. The simple change into the auxiliary service some-

times has this effect ; but most frequently, as the Society of Neurology has justly admitted on the proposition of Dupré (70) and of Lépine (124), the best measures to take are temporary half-pay with a gratuity. Laignel-Lavastine justly remarks, from our point of view, that a small gratuity (10 to 30 per cent.) would prevent either the suggestion of a serious disorder or the development of pernicious *ministrosis*, which is to be feared in this category of patients.

• Emotive neurasthenia is of less purely emotive and military origin ; not only are the patients generally more predisposed, not only have they sometimes had attacks previously in civil life, but even the causation of their war attack, as we have often said, has not emotions of a military order as its sole motive. A convalescent leave of a few months is often an adequate expedient. In default of this, as a large number of neurasthenics are still capable of serving in some relatively sedentary and sheltered occupation, the most usual rule should be to transfer them into the auxiliary service. In certain cases, however, the importance of the organic disorders, testifying to a very real and marked physical and mental depression, or the addition of symptoms of emotive neurosis, should entail temporary half-pay with, or without, a moderate gratuity.

As we have said, the relation of cause and effect exists between the commotions and emotions of war and confusional states fairly frequently, but much more rarely in the case of *dementia præcox*, general paralysis or epileptic attacks.

Mental confusion should be treated during its

whole course in the psychiatric services of the army or the hospitals connected with them. Ordinarily it is of much shorter duration than the toxic-infectious mental confusion of ordinary life, which generally appears to supervene in patients with a marked predisposition. Sometimes, however, it almost amounts to a genuine post-confusional chronic psychosis; and, as the patients cannot be kept indefinitely in a military hospital, the question of half-pay is raised. When the confusion has clearly resulted from events of the war, according to the Society of Neurology, No. 1 half-pay, with an incapacity assessment of 20 to 80 per cent., may be granted.

Dementia præcox is so exceptional, as the result of events of war, that one may ask if these have played any part at all in its genesis. The facts of pseudo-dementia præcox, frequently exhibiting a very rich symptomatology but generally recovering in the end, have been multiplied as the result of commotions. The diagnosis can only be based on vague symptomatic shades, and often it is the evolution alone which enables a conclusion to be arrived at; therefore much reserve must be shown in awarding half-pay, and temporary half-pay, with a renewable gratuity seems to us a very admissible expedient.

If, later, it is proved that it is a case of genuine dementia præcox, should No. 1 or No. 2 half-pay be granted? The Society of Neurology, rejecting with Dide all relation of cause and effect between the traumatism and the dementia præcox, only admits No. 2 half-pay. From what we have said, it does not seem conclusively proved to us that, in certain cases, the commotional concussion itself, far more

than a genuine wound, may not cause an anatomical ensemble altogether analogous to dementia præcox. On this hypothesis we should have a tendency to accept, with Dupré and Lépine, a No. 1 half-pay, with incapacity assessment of 10 to 50 per cent. or even more, on condition that the commencement of the affection was indisputably consecutive to a real commotion.

General paralysis has given rise to much discussion, because, on the one hand, it is much more frequent, and, on the other, because its etiology seems much better known. Two circumstances are apparently generally admitted :—

1st. General paralysis has not become more frequent during the war, either amongst civilians or in the army. Professor Pierre Marie has reported that, out of thousands of cases of cranial wounds, he has not seen a single case of general paralysis. We can say that, amongst a number of commotional cases, we have not either; and that the somewhat rare cases of progressive general paralysis we have observed since the beginning of the war were produced irrespective of any conditions of war.

2nd. Syndromes of pseudo-general paralysis exist which are sometimes more or less directly consecutive to commotions, but are curable after longer or shorter intervals of delay. These syndromes are distinguished by much greater consciousness of the morbid condition, by the usual absence of pupillary disturbances and especially of the Argyll-Robertson sign, by the absence, or very slight degree, of cephalospinal lymphocytosis, and by the generally negative result of the Wassermann reaction. In the absence of

these laboratory examinations, it is sometimes very difficult to come to a definite conclusion, and temporary half-pay would be a makeshift which might prevent mistakes.

But in the case of true general paralysis what part would commotional traumatism play? The majority of neurologists admit the constant syphilitic origin of the affection, reducing to a minimum the influence of traumatism. In almost all cases they only accept No. 2 half-pay; in some exceptional cases where an encephalic traumatism may be legitimately invoked in the acceleration or aggravation of the disease, they admit No. 1 half-pay, and fix the incapacity assessment at 10 to 30 per cent. (Society of Neurology, 15th December 1916). There is no doubt we must regard the diffuse traumatic lesions of the cerebral commotion as playing a traumatizing and localizing part at least as important as the wounds, properly so called, of the cranium or brain.

Whatever the reason for fixing such a low assessment of invalidism in cases where the relation of cause and effect between the traumatism and the disease seems most probable, it has been necessary for the Society of Neurology to consider the previous condition of the patient "and to subtract from the assessment of total invalidity the assessment of invalidity due to the former disease" [Dabout (51)]. This is contrary to a great part of our present legislation, notably that in respect of industrial accidents. Further, even if one does not accept the opinion of authors who consider that syphilis is not indispensable, "general paralysis is certainly not syphilis alone, as Lépine says, it is syphilis plus something

with which we are unacquainted; . . . traumatisms, physical, intellectual and moral overwork, are elements of which clinical observation cannot mistake the value." It is, therefore, difficult to admit that former syphilis, as it were, puts general paralysis in possession. It is not proved that commotional traumatism may not sometimes play not only the part of a revealing, accelerating and aggravating agent, but also that of a localizing agent of syphilis and, as a result, cause the general paralysis. This is what the Clinical Society of Mental Medicine and the Society of Psychiatry (7th July 1917) have considered in admitting (in rare and well-specified cases, it is true) the possibility of a No. 1 half-pay, with incapacity assessment extending up to 60 or 80 per cent. This is a view which appears to have been adopted by the Under-Secretary of the Ministry of Health.

The appearance of authentic, Jacksonian or generalized attacks of epilepsy in evident and almost immediate relation with the commotion has been proved in some exceptional cases (those of Guillain, Léri, etc.); in instances of this kind observation is necessary, and if the disturbances become chronic and are incompatible with service, No. 1 half-pay is justified, with a gratuity of 10 to 80 per cent.

But epilepsy is most frequently the manifestation of more or less limited cortical sclerosis; now sclerosis is a secondary, cicatricial, delayed lesion; the result is that one of the characteristics of epilepsy is for it not to appear until a fairly long time after the occurrence which provoked it. One can understand that, in these cases, appreciation is always delicate, especially when the traumatism has been

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